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DECEMBER, 1984

INITIAL ASSESSMENT STUDY OF NAVAL AIR STATION, OCEANA VIRGINIA BEACH, VIRGINIA

NEESA 13-067

NAVAL ENERGY AND ENVIRONMENTAL
SUPPORT ACTIVITY
Port Hueneme, California 93043

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INITIAL ASSESSMENT STUDY
NAVAL AIR STATION OCEANA, VIRGINIA BEACH, VIRGINIA

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Prepared by:

Rogers, Golden & Halpern
1427 Vine Street
Philadelphia PA 19102

in association with
BCM Eastern, Inc.
Plymouth Meeting, PA

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Initial Assessment Study Team Members

Jack A. Halpern, Principal-in-Charge
Roger D. Moose, Project Manager, Hydrogeologist
Robert W. Pierson, Jr., Team Leader, Chemist
Sandy Dechert, Technical Writer
B. William Garland, Biologist
Larry Johnson, Industrial Hygienist, BCM
Thomas Roginski, Ordnance Chemist, BCM
Terence Vogt, Environmental Engineer

Naval Energy and Environmental Support Activity

Wallace Eakes
Project Manager

Prepared for:

NAVY ASSESSMENT AND CONTROL
OF INSTALLATION POLLUTANTS DEPARTMENT
Naval Energy and Environmental Support Activity
Port Hueneme, California 93043

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EXECUTIVE SUMMARY

This report presents the results of an Initial Assessment Study (IAS) conducted at the Naval Air Station (NAS) Oceana, Virginia Beach, Virginia. The purpose of an IAS is to identify and assess sites posing a potential threat to human health or to the environment due to contamination from past hazardous materials operations.

The primary concern in the NAS Oceana area is the contamination of surrounding surface water systems through runoff and/or groundwater discharge. Ground water is not used as a potable water source for the base or adjacent community. Streams that rise on the base lead to marshes and waterways that provide habitat for wildlife species and are used for recreational fishing and boating.

Based on information from historical records, aerial photographs, field inspections, and personnel interviews, a total of sixteen potentially contaminated sites were identified at NAS Oceana. Each of the sites was evaluated with regard to contamination characteristics, migration pathways, and pollutant receptors.

The study concludes that, while none of the sites poses an immediate threat to human health or to the environment, six warrant further investigation under the Navy Assessment and Control of Installation Pollutants (NACIP) program to assess potential long-term impacts. A Confirmation Study, involving sampling and monitoring of the six sites, is recommended to confirm or deny the presence of the suspected contamination and to quantify the extent of any problems that may exist. The six sites recommended for confirmation are listed below in order of priority:

- Site 1, West Woods Oil Disposal Area,
- Site 2, Line Shack Oil Disposal Areas
- Site 5, Old Static Engine Test Cell Mercury Spill
- Site 7, Fifth Green Landfill
- Site 8, North Station Landfill; and
- Site 14, Fentress Landfill

The results of the Confirmation Study will be used to evaluate the necessity of conducting remedial measures or cleanup operations.

No further action under the NACIP program is recommended for the remaining 11 sites.

ACKNOWLEDGMENTS

The Initial Assessment Study team commends the support, assistance, and cooperation provided by personnel at Atlantic Division, Naval Facilities Engineering Command; Naval Energy and Environmental Support Activity; Ordnance Environmental Support Office; Naval Air Station Oceana. In particular, the team gratefully acknowledges the outstanding effort provided by the following people, who participated in the successful completion of the study.

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- LCDR G. C. Lappano, Assistant Public Works Officer, Naval Air Station, Oceana
- David Morton, Public Works Department, Naval Air Station, Oceana
- William D. Ponton, Public Works Department, Naval Air Station, Oceana
- Richard A. Phelps, Public Works Department, Naval Air Station, Oceana
- Aaron A. Parson, Public Works Department, Naval Air Station, Oceana
- Joseph G. Wallmeyer, Environmental Engineer, Atlantic Division, Naval Facilities Engineering Command
- Pamela Clements, Ordnance Environmental Support Office
- Paul Rakowski, Supervisory Environmental Engineer, Atlantic Division, Naval Facilities Engineering Command

NEPSS

Naval Environmental Protection Support Service

FOREWORD

The Department of the Navy developed the Navy Assessment and Control of Installation Pollutants (NACIP) program to identify and control environmental contamination from past use and disposal of hazardous substances at Navy and Marine Corps installations. The NACIP program is part of the Department of Defense Installation Restoration program and is similar to the Environmental Protection Agency's "Superfund" program authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

In the first phase of the NACIP program, a team of engineers and scientists conducts an Initial Assessment Study (IAS). The IAS team collects and evaluates evidence of contamination that may pose a potential threat to human health or to the environment. The IAS includes a review of archival and activity records, interviews with activity personnel, and an on-site survey of the activity. This report documents the findings of an IAS at the Naval Air Station (NAS) Oceana, Virginia Beach, Virginia.

Confirmation studies under the NACIP program were recommended for six sites at NAS Oceana. Atlantic Division, Naval Facilities Engineering Command (LANTNAVFACENGCOM) will assist NAS Oceana in implementing the recommendations.

Questions regarding this report should be referred to the Naval Energy and Environmental Support Activity 112N at AUTOVON 360-3351, FTS 799-3351, or commercial (805) 982-3351. Questions concerning confirmation work or other follow-on efforts should be referred to LANTNAVFACENGCOM 114 at AUTOVON 564-9566, FTS 954-9566, or commercial (804) 444-9566.

W.L. Nelson

W.L. NELSON,
LCDR, CEC, USN
Environmental Officer
Naval Energy and
Environmental Support Activity

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I. INTRODUCTION

1.1 PROGRAM BACKGROUND. Past hazardous waste disposal methods, although acceptable at the time, have often caused unexpected long-term problems through release of hazardous pollutants into the soil and ground water. In response to a growing recognition of these problems, the U.S. Congress directed the U. S. Environmental Protection Agency (EPA) to develop a comprehensive national program to manage past disposal sites. The program is outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980.

1.1.1 DOD Program. Department of Defense (DOD) efforts in this area preceded the nationwide CERCLA program. In 1975, the U.S. Army developed for DOD a pilot program to investigate past disposal sites at military installations. In 1980, DOD named this program the Installation Restoration Program, and instructed the services to comply with program guidelines.

1.1.2 Navy Program. The Navy manages its part of the program, the Navy Assessment and Control of Installation Pollutants (NACIP), in three phases. Phase one, the Initial Assessment Study (IAS), identifies disposal sites and potentially contaminated areas caused by past hazardous substance storage, handling, or disposal practices at naval activities. These sites are then individually evaluated with respect to their potential threat to human health or to the environment. Phase two, the Confirmation Study, verifies or characterizes the extent of contamination present and provides additional information regarding migration pathways. Phase three, Remedial Action, provides the required corrective measures to mitigate or eliminate confirmed problems.

1.2 AUTHORITY. The Chief of Naval Operations (CNO) initiated the NACIP program in OPNAVNOTE 6240 of 11 September 1980, superseded by OPNAVINST 5090.1 of 26 May 1983. Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM) manages the program within the existing structure of the Naval Environmental Protection Support Service (NEPSS), which is administered by the Naval Energy and Environmental Support Activity (NAVENENVSA). NAVENENVSA conducts the program's first phase, the IAS, in coordination with COMNAVFACENGCOM Engineering Field Divisions (EFDs). Activities are selected for an IAS by CNO, based on recommendations by COMNAVFACENGCOM, the EFDs, and NAVENENVSA. Approval of the Naval Air Station (NAS) Oceana, Virginia Beach, Virginia for an IAS is contained in CNO letter ser 451/3U392444 of 5 July 1983.

1.3 SCOPE.

1.3.1 Past Operations. The NACIP program focuses attention on past hazardous substance storage, use, and disposal practices on Navy property. Current practices are regularly surveyed for conformity to state and federal regulations and therefore are not included in the scope of the NACIP program. The IAS addresses operational non-hazardous disposal and storage areas only if they were hazardous waste disposal or storage areas in the past. Current operations are investigated solely to determine what types and quantities of chemicals or other materials were used and what disposal methods were practiced.

1.3.2 Results. If necessary, an IAS recommends mitigating actions to be performed by the activity or recommends Confirmation Studies to be administered by the EFD under the NACIP program. Based on these recommendations, COMNAVFACENGCOM schedules Confirmation Studies for those sites which have been determined by scientific and engineering judgment to be potential hazards to human health or to the environment.

1.4 INITIAL ASSESSMENT STUDY.

1.4.1 Records Search. The IAS begins with an investigation of activity records, followed by a records search of various government agencies including EFDs, national and regional archives and records centers, and U.S. Geological Survey offices. In this integral step, study team members review records to assimilate information about the activity's past missions, industrial processes, waste disposal records, and known environmental contamination. Examples of records include activity master plans and histories, environmental impact statements, cadastral records, and aerial photographs. Appendix A lists the agencies contacted during this study.

1.4.2 On-Site Survey. After the records search, the study team conducts an on-site survey to complete documentation of past operations and disposal practices and to identify potentially contaminated areas. With the assistance of an activity point-of-contact, the team inspects the activity during ground and aerial tours, and interviews long-term employees and retirees. The on-site survey for NAS Oceana was conducted from 23 to 27 April 1984; the information in this report is current as of those dates.

Information obtained from interviews is verified by data from other sources or from corroborating interviews before inclusion in this report. If information for certain sites is conflicting or inadequate, the team may collect samples for clarification.

1.4.3 Confirmation Study Ranking System. With information collected during the study, team members evaluate each site for its potential hazard to human health or to the environment. A two-step Confirmation Study Ranking System (CSRS) developed at NAVENENVSA is used to systematically evaluate the relative severity of potential problems. The two steps of the CSRS are a flowchart and a numerical ranking model. The first step when using the CSRS is a flowchart based on type of waste, containment, and hydrogeology. This step eliminates innocuous sites from further consideration. If the flowchart indicates a site poses a potential threat to human health or to the environment, the second step, the model, is applied. This model assigns a numerical score from 0 to 100 to each site. The score reflects the characteristics of the waste, the potential migration pathways from the site, and possible contaminant receptors on and off the activity.

1.4.4 Site Ranking. After scoring a site, engineering judgment is applied to determine the need for a Confirmation Study or for immediate mitigating action. At sites recommended for further work, CSRS scores are used to rank the sites in a prioritized list for scheduling projects. For a more detailed description, refer to NEESA 20.2-042, Confirmation Study Ranking System.

1.4.5 Confirmation Study Criteria. A Confirmation Study is recommended for sites at which (1) sufficient evidence exists to indicate the presence of contamination and (2) the contamination poses a potential threat to human health or to the environment.

1.5 CONFIRMATION STUDY. Generally, the EFD conducts the Confirmation Study in two steps--verification and characterization. In the verification phase, short-term analytical testing and monitoring determines whether specific toxic and hazardous materials, identified in the IAS, are present in concentrations considered to be hazardous. Normally, the IAS recommends verification phase sampling and monitoring.

The design of the characterization phase usually depends on results from the verification phase. If required, a characterization phase, using longer-term testing and monitoring, provides more detailed information concerning the horizontal and vertical distribution of contamination migrating from sites, as well as site hydrogeology. If sites require remedial actions or additional monitoring programs, the Confirmation Study recommendations include the necessary planning information for the work, such as design parameters.

1.6 IAS REPORT CONTENTS. In this report, the significant findings and conclusions from the IAS are presented in Chapter 2. Recommendations are presented in Chapter 3. Chapter 4 describes general activity information, history, biology, and physical features. Chapters 5 through 8 trace the use of chemicals and hazardous materials from storage and transfer, through manufacturing and operations, to waste processing and disposal. The latter chapters provide detailed documentation to support the findings and conclusions in Chapters 2 and 3.

2. SIGNIFICANT FINDINGS AND CONCLUSIONS

2.1 INTRODUCTION. This chapter summarizes the significant findings and conclusions of the IAS regarding characteristics of the disposal and spill sites identified at NAS Oceana and outlying areas. Outlying areas included in the investigation were NALF Fentress, Dare County Range, Palmetto Point Range, Tangier Island Range, Stumpy Point Range, Harvey Point Range, Air Combat Maneuvering Range, and Wadsworth Homes on Camp Pendleton. First, aspects of the local geology, surface drainage, hydrogeology, and biology are discussed with regard to potential contaminant migration pathways and potential contaminant receptors. Next, significant findings for sites recommended for confirmation studies are summarized and conclusions presented. Finally, sites not recommended for confirmation are discussed.

2.1.1 Hydrogeology and Migration Potential. NAS Oceana is located in the Tidewater region of Virginia (Figure 2-1). The base lies southeast of Norfolk, immediately west of the Atlantic Ocean, and just south of the Chesapeake Bay in Virginia Beach. Commissioned an Auxilliary Landing Field in 1941, it has developed into full Naval Air Station status and was commissioned the first Master Jet Base. The present Main Base has replaced the original North Station and USMC Bougainville areas which were the first constructed sections of the base (Figure 2-2). Demolition of the buildings in these areas is almost complete in 1984.

NAS Oceana is underlain by a shallow (less than ten feet below the ground surface) water table aquifer. This aquifer is composed of the geologically recent sand and gravel of marine and shoreline deposits. The deposits range from 10 to 50 feet thick in the area of the base. The shallow water table aquifer is not used for potable supplies in the area of the base. This area is served by public water from the cities of Norfolk and Virginia Beach. Use of water from the shallow aquifer for lawn irrigation and filling swimming pools has been reported.

Deeper water-bearing zones are present in this outer portion to the Atlantic Coastal Plain. The deeper water-bearing zones are not used for potable purposes in the area of NAS Oceana. They are used farther west in the Tidewater region. They are protected from surface activities by intervening geologic layers that do not transmit water readily. Surface drainage from the base primarily drains into West Neck Creek and London Bridge Creek (except for the northern part, which draws into the Great Neck Creek). These creeks in turn flow into Lynnhaven Bay and Linkhorn Bay, respectively. These bays are used primarily for ports for sport and fishing industry vessels. Contact recreation (water skiing and swimming, for example) are limited uses of these bays. No commercial fishing occurs in the shallow waters of these bays.

Soils on NAS Oceana base are primarily the sands and silts of a coastal complex. They tend to permit rapid migration of fluids like water and leachates without providing an opportunity for renovation, which more organic soils would allow. However, the limited topographic relief and water table slopes in the area provide a limited driving force for the migration of surface and ground waters. The result is that contaminants move very slowly from their source on the ground toward surface drainage features that are nearby. Once in the surface drainage features, migration of the contaminants is controlled most closely by the storm water flow resulting from precipitation. Renovation is not an important factor in the attenuation of contaminants in this environment.

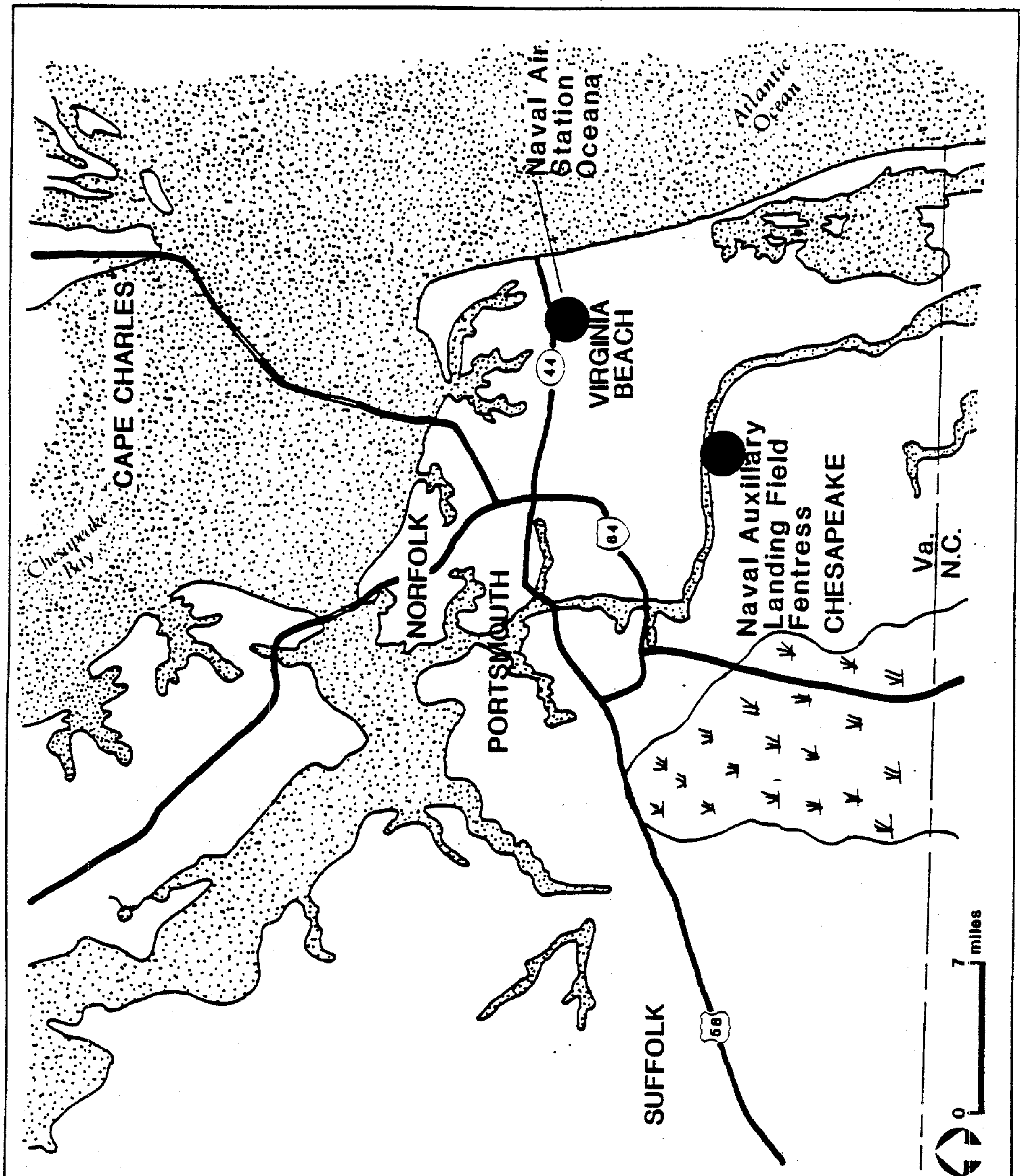

Figure 2-1
General Location Map

Rogers, Golden & Halpern

Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

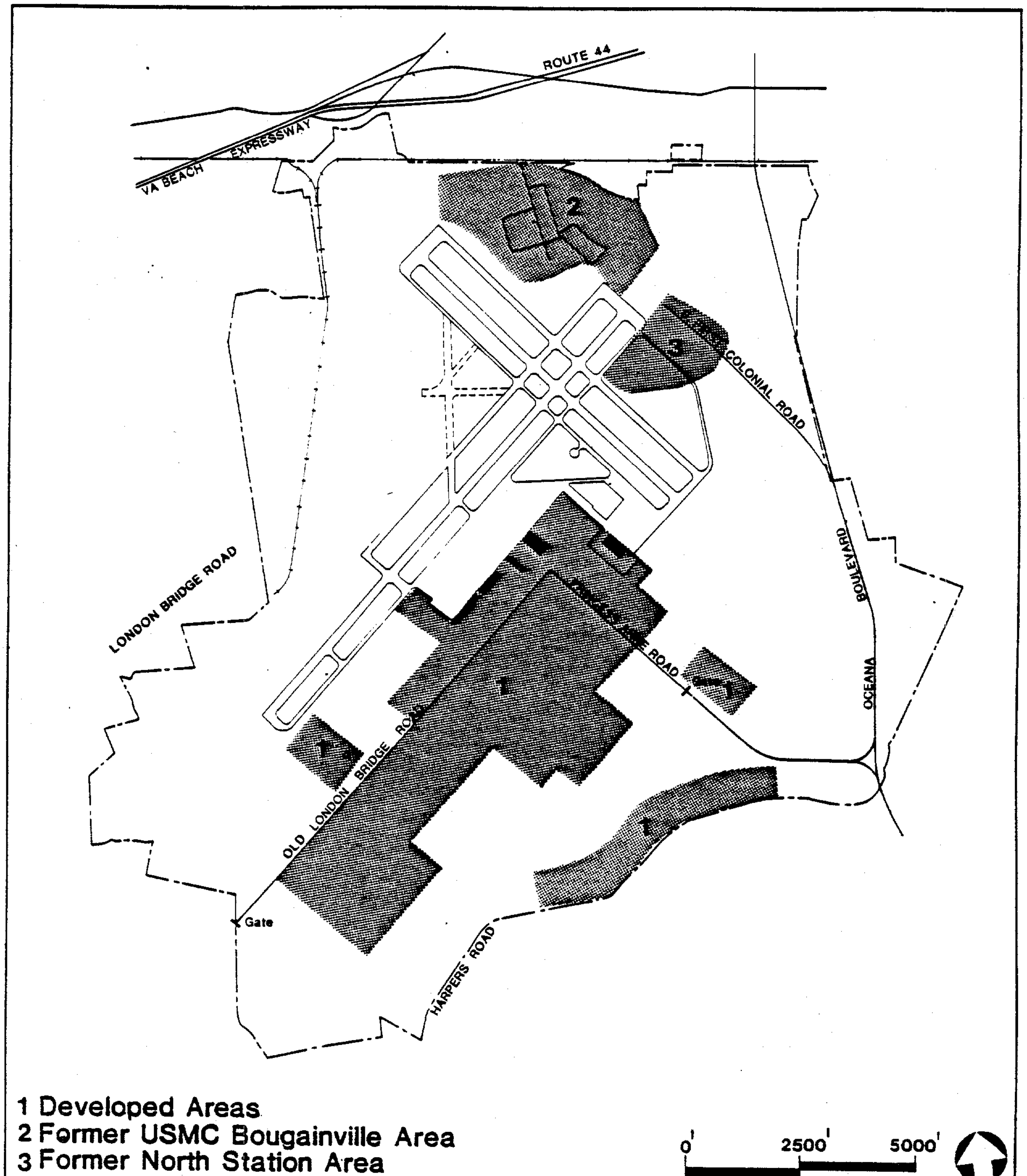

Figure 2-2
Naval Air Station Oceana

Rogers, Golden & Halpern

Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

2.2 SITES RECOMMENDED FOR CONFIRMATION. Of the 16 disposal and spill sites identified at NAS Oceana and NALF Fentress, 6 are recommended for Confirmation Studies. Table 2-1 summarizes the findings on all the disposal and spill sites. Figure 2-3 shows the locations of these sites.

2.2.1 Site 1, West Woods Oil Disposal Pit. The site is an old oil disposal pit, about 25 feet in diameter, located about 1,000 feet west of abandoned Runway 9 on the west side of the station. It was used between the mid-1950s and the late 1960s to dispose of waste oil, fuel, and other aircraft maintenance chemicals. Oil displaced from it by flood waters in the late 1960s contaminated properties off-base; its use was stopped and it was filled in with soil.

Fuels (JP-5, JP-3, and AVGAS), oils, PD 680, and various chlorinated hydrocarbons and aromatic compounds (trichlorotrifluoromethane, benzene, toluene and derivatives, and naptha) are the wastes of concern. These substances are found in paint stripping formulations and in degreasing agents that have been used in the aircraft maintenance facilities at Oceana and are likely to have been discarded with POLs in the West Woods oil pit. It is estimated that about 100,000 gallons of wastes were placed in the pit over its period of use and that large volumes remain held by capillary action in the soil and as a free-floating lens on the water table surface.

Migration of these wastes, either floating on the water table or dissolved in low concentration in ground water, would be toward a drainage ditch about 250 feet to the west of the pit site. This ditch drains to London Bridge Creek and ultimately to Lynnhaven Bay. Receptors would be the fish and wildlife in these water bodies and their recreational users. Because of the migration pathway to Lynnhaven Bay, this site is recommended for a confirmation study.

2.2.2 Site 2, Line Shack Oil Disposal Areas. This site includes oil disposal areas behind Line Shacks 31-33, 109, 125, 131, and 400. These buildings were built in 1963. Although the Public Works hazardous waste pickup procedures were instituted in September of 1981 and resulted in a tripling of the wastes collected, field checks in 1984 revealed that these areas are still being used to some extent to dump oily wastes onto the ground.

The soil from beneath Line Shack 125 was excavated in the early 1980s and was found to be saturated with oily substances down to about 6 feet. Although the amounts of wastes disposed of over the past 20 years is not known, it is likely to be several to many thousands of gallons at each site. These wastes would be held by capillary action to soil particles to the point of saturation, beyond which they would form a free-floating lens above the water table. Both forms would be a source of dissolved toxic substances in the ground water. All line shack oil disposal areas are subject to the leaching effects of infiltrating rain water except that of Line Shack 400, which was covered with concrete in the early 1980s. Of the remaining ones, Line Shack 125 appeared by visual inspection to have the most extensive contamination, followed by Line Shacks 31-33, 109, and 131.

The wastes of concern are oil, hydraulic fluid, PD 680, and aromatic hydrocarbons (naptha, benzene, toluene, and derivatives) that are or have been commonly used in aircraft maintenance for lubrication, paint stripping, and grease removal. From the early 1960s when the line shacks began operation and 1981 when the Public Works hazardous pickup began, it is estimated that between 7,000 to 15,000 gallons of wastes were discarded behind the line shacks.

Table 2-1

Summary of Disposal and Spill Sites at Naval Air Station Oceana, Virginia

Site Number	Site Name	Map Coordinates[a]	Period of Operation	Types of Materials Disposed	Comments
SITES RECOMMENDED FOR CONFIRMATION STUDIES					
1	West Woods Oil Disposal Pit	12-M	Mid-1950s to late 1960s	Waste fuel, oil, chlorinated and aromatic hydrocarbon solvents.	
2	Line Shack Oil Disposal Areas	13-S, 18-R 15-R, 16-Q 17-Q	1963-1981	Waste fuel, oil, chlorinated and aromatic hydrocarbon solvents.	
5	Old Static Engine Test Cell Mercury Spill	14-S	1965-1973	Mercury	
7	Fifth Green Landfill	17-W	1954-1961	Solvents, pesticides, construction debris, transformers, mixed municipal wastes, unknowns.	
8	North Station Landfill	21-P	About 1951-1954	Solvents, pesticides, transformers, mixed municipal wastes, construction debris unknowns.	
14	Fentress Landfill	14-a[b]	1945-1970	Solvents, pesticides, mixed municipal wastes, construction debris, unknowns.	

a General Development Plan - NAS Oceana, VA 12/2/66

b Naval Auxiliary Landing Field, Fentress, VA: key map (no date).

Table 2-1

Summary of Disposal and Spill Sites at Naval Air Station Oceana, Virginia
(continued)

Site Number	Site Name	Map Coordinates	Period of Operation	Types of Materials Disposed	Comments
SITES NOT RECOMMENDED FOR CONFIRMATION STUDIES					
3	West Side Landfill	13-N	1940s	Construction debris, mixed municipal wastes, unknowns	
4	Bougainville Mercury Spill	18-L	1975-1982	Mercury	
6	Navy Exchange Building Oil Disposal Area	15-T	1970s	Waste motor oil	
9	Construction Staging Area	12-W	Intermittent since late 1950s	Railroad Ties, scrap iron	
10	Air Compressor Yard	17-Q	1973-1983	Air compressor oil	
11	Fire Fighter Training Area	14-M	Early 1960s-mid-1970s	POLs, aromatic and chlorinated hydrocarbons, unknowns.	
12	Day Tank	15-P	1952-1982	JP-5 and other fuels	
13	Tank Farm	11,12-K	1951-1982	JP-5 and other fuels	
15	Abandoned Tank	16, 17-J	Mid-1950s to mid-1970s	Fuels and waste oils.	
16	PWD Pesticide Shop	15-U	Since mid -1950s	Pesticides	

a Master Shore Station Development Plan - NAS Oceana, VA 12/2/66

b Naval Auxiliary Landing Field, Fentress, VA: key map (no date).

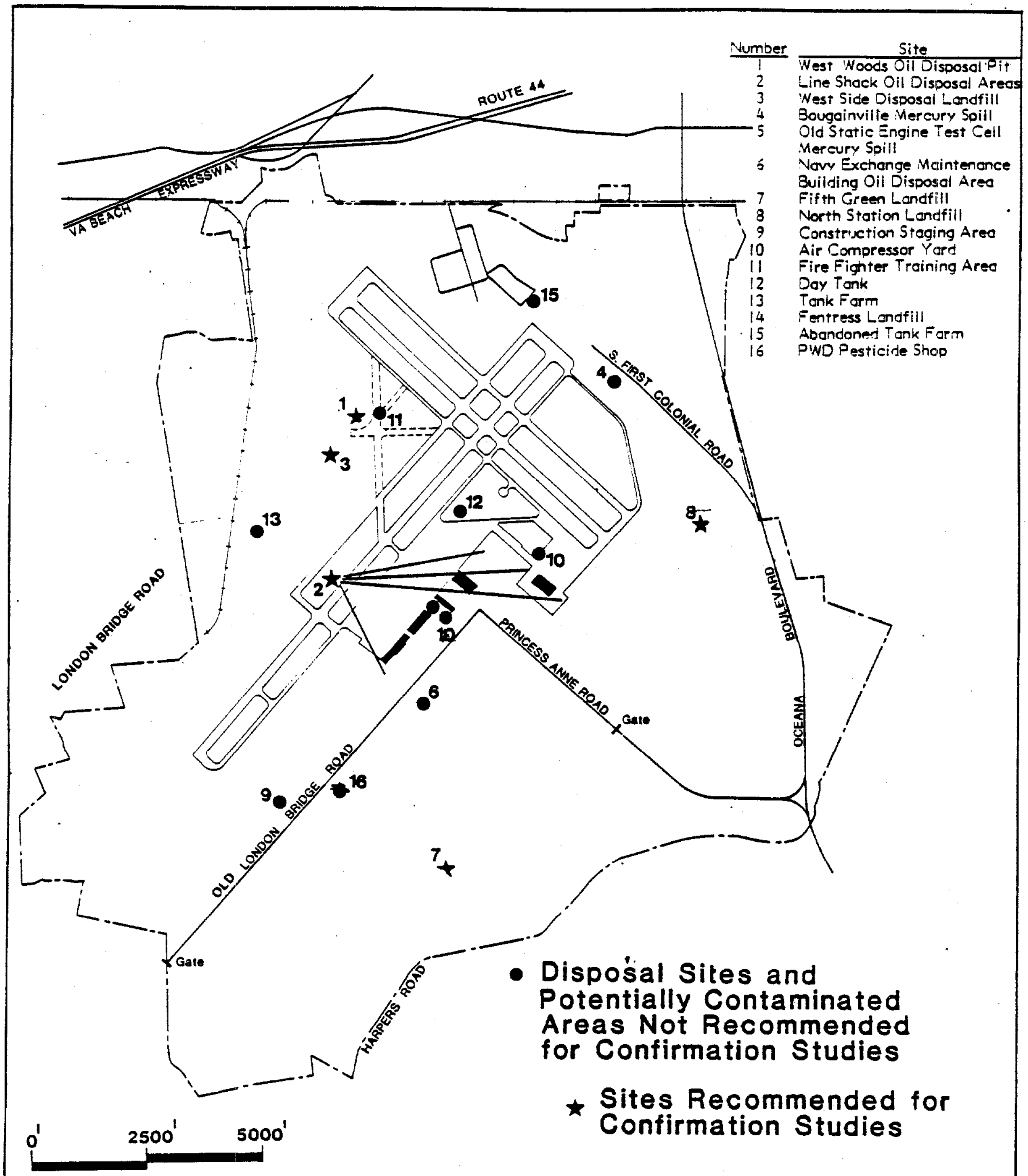

Figure 2-3
Sites Recommended for Confirmation Studies and Other Disposal Sites

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The line shacks are various distances ranging from about a hundred feet to 1,200 feet from drainage ditches. Underground flow would follow the same pathways as overland flow to the drainage ditches. These ditches converge within the station boundaries and join the waters of the West Neck Creek and ultimately those of Lynnhaven Bay. Receptors are wildlife in these water bodies and their recreational users. Due to the migration pathways possible to receptors, this site is recommended for confirmation.

2.2.3 **Site 5, Old Static Engine Test Cell Mercury Spill.** This site is the interior floor and the pedestrian approach to the old static engine test cell (Building 305). The control room floor is visibly contaminated with small mercury globules. It is possible that the ground outside the control room entrance is also contamined with mercury. The total metallic mercury on the floor could be up to one pound. Possible spillage outside the building on the ground probably would range from zero to three pounds.

The mercury spill in the test cell control room is contained by the floor but is a source of vapors that are a potential health hazard by inhalation. Any mercury carried outside could enter the soil just below the concrete entrance slab.

A confirmation study of this site is recommended.

2.2.4 **Site 7, Fifth Green Landfill.** This site is a four-acre area located beneath the fifth green of the station golf course. It was used as the base landfill between 1954 and 1961. Wastes were placed in trenches and burned, and then residuals were covered. Later it was covered, graded, and seeded for use as part of the golf course.

Its hazardous waste content is represented by pesticides, heavy metals, oil, aromatic and halogenated hydrocarbons, PCBs, mixed municipal wastes, and unknowns. It is likely that these items were incompletely burned or are not flammable.

Contaminants that leach from the landfill by precipitation or fluctuations in ground water level would be carried down gradient through soils to a drainage ditch within two hundred feet to the north of the site. There have been no water quality measurements of this ditch by which to confirm a leachate problem. The ditch merges with another one, then joins the waters of West Neck Creek, which then flow north to Lynnhaven Bay.

Confirmation of this site is recommended.

2.2.5 **Site 8, North Station Landfill.** This site is about a four-acre area located in the east side of the old North Station airfield near the end of runway 32R. It was a water-filled pit into which wastes were placed and was used as the station landfill between the early and mid-1950s. Because this landfill was the recipient of all solid wastes during its period of operation, its hazardous waste content included solvents, pesticides, construction debris, municipal wastes, electrical conductors and transformers, and sanitary, photo lab, and hospital wastes.

The site is about 900 feet east of a drainage ditch that flows north into Great Neck Creek and thence into Linkhorn Bay. Contaminants that leach from the landfill by precipitation or by fluctuations in water table level would be carried to these water bodies in the ground water. Affected receptors would be wildlife and recreational users.

2.2.6 **Site 14, Fentress Landfill.** This site is the now-closed landfill at NALF Fentress. It is located at the north end of Runway 23. It was used between 1945 and 1970 and covers about 3 acres. The pollutants of concern are asbestos, pesticides, PCBs, oil, and chlorinated and aromatic solvents.

The site is within several hundred feet of a drainage ditch that runs the length of the main runway. Contaminants from the landfill would move with ground water to the drainage ditch which flows off-base to join the Pocaty River. Recipients of concern are marsh and riverine wildlife.

This site is recommended for confirmation.

2.3 SITES NOT RECOMMENDED FOR CONFIRMATION STUDIES. Ten of the 15 potentially contaminated sites are not recommended for confirmation studies. Significant findings for these sites are summarized in Table 2-1. The locations of these sites are shown in Figure 2-2.

2.3.1 Site 3, West Side Landfill. The site is a six-acre, solid waste disposal area on the west side of the station about 1,000 feet south of Site 1. It was used between the early 1940s and at least 1945. By 1949 the site had been graded. It is likely that this site served as the station landfill during its early construction and the site is therefore likely to contain a large proportion of construction debris. Since there is no information available on this site other than its appearance on a 1945 map of the base, it is not recommended for confirmation studies.

2.3.2 Site 4, Bougainville Mercury Spill. This site is a suspected mercury spill area next to a dirt road at the Bougainville area of North Station. Mercury-contaminated material from cleanup of a spill at the old static engine test cell was stored at this site in the early 1980s in boxes that were later found to be leaking mercury. Soil samples were taken from the contaminated area in 1984. The results reported by COMNAVFACENGCOM letter of 25 May 1984 to Commanding Officer Oceana indicate that there is no contamination at the site. Thus additional confirmation study of this site is not needed at this time.

2.3.3 Site 6, Navy Exchange Maintenance Building Waste Oil Disposal Area. This site is a strip of ground about 25 feet long next to a fence outside Building 518, the Naval Exchange maintenance building. For a ten-year period about 15 gallons per year of waste oil were dumped on the site.

Due to the small volume of oil contaminating this site (approximately 150 gallons) it is likely that soil near the ground surface holds the waste oil by capillary action and that contaminants are only slowly leached into the ground water by infiltrating precipitation. Therefore, no receptors are anticipated and the site is not recommended for a confirmation study. However, mitigative measures to clean up this site are recommended.

2.3.4 Site 9, Construction Staging Area. This site is a 1.5-acre area along London Bridge Road opposite the Weapons Department complex. It was used in late 1950s as a construction staging area. It currently holds several hundred old and discarded railroad ties and some rusting iron plates and fasteners. The rail ties are bleached, decaying, and appear to be free of creosote material. These items pose no threat to the environment or to human health. There is no information to indicate that this site ever contained hazardous wastes or materials. Therefore, no confirmation study is recommended. Mitigation actions for aesthetic reasons are to remove the rail ties and metal plates to the landfill.

2.3.5 **Site 10, Air Compressor Yard.** This site is located 1,300 feet northeast from Building 122 (MATWING). The pollutants of concern are air compressor oil and JP-5 fuel lost to the ground on the periphery of the compressor yard over a 10-year period. Although mitigative actions to contain the oil have been taken by the installation of an oil/water separator, the ground around the yard and a nearby drainage ditch are heavily contaminated with oil and fuel. It is estimated that 1,800 gallons of oil contaminate this site.

2.3.6 **Site 11, Fire Fighter Training Area.** This site is an area on abandoned Runway 18-36 on the west side of the base, where waste fuels are burned to train fire fighters. It has been used since the early 1960s. Until the mid-1970s, fires were set by pouring waste POLs and other hazardous wastes (paints, thinners, strippers; PD 680, naptha, trichlorotrifluoroethane) amounting to 7,500 gallons per year directly on the runway; more recently, fires of about 50,000 gallons per year have been set in an earth-bermed circle constructed to contain the fires and prevent loss of unburned POLs. The Fire Prevention Branch monitors the level of liquid in the pit and pumps out the water phase when the unburned fuel floating on the water threatens to overtop the berm. In addition, it is currently installing another fire ring connected directly to an oil/water separator which, if properly maintained, will further safeguard against loss of POL and contamination of the ground water.

The pollutants of concern are unburned POLs and other hazardous wastes that are thought to have overflowed the fire pit and infiltrated the soil adjacent to the runway. However, some unburned fuel has escaped confinement by the berm and escaped to the surrounding soils. A one percent loss rate of hazardous waste from confinement would result in a loss of about 5,000 gallons over the 24 years the fire pits have been used. Although there is some vegetation damage just north of the fire pit that would confirm this, a recent field investigation (R. E. Wright Associates, 1983) revealed that there is not a significant amount of fuel occurring in the subsurface soils (no concentrations given) immediately adjacent to the fire pit. Therefore, no confirmation or mitigation is recommended.

2.3.7 **Site 12, Day Tank.** The site is an area around the 220,000-gallon day tank just east of Runway 23. Overfilling of the tank and leaks in the underground return evacuation lines leading from the refueling pits to the day tank have resulted in significant amounts of aircraft fuel held by capillary action in the soil around the day tank and a few thousand gallons of fuel floating on the water table along the evacuation pipeline (R. E. Wright Associates, 1983).

Due to the lack of slope in this area, it is very unlikely that pure fuel will migrate away from the site on the water table. However, both bound and free-floating fuel will result in contamination of groundwater by dissolved fuel.

The cited study recommends recovery wells with a pump or bailer to remove the fuel lens, air stripping to remove dissolved fuel from groundwater and biodegradation using bacteria to free the soil of fuel held by capillary action.

Mitigation has been previously recommended (R. E. Wright Associates, 1983) and POLs are not considered hazardous wastes in Virginia.

2.3.8 **Site 13, Tank Farm.** This site is the area around the Tank Farm. It is located between Runway 23 and London Bridge Road. Fuel leaks of JP-3, JP-5, and AVGAS from the eight storage tanks in the Tank Farm and from the pipeline supplying them over a 30-

year period have resulted in an estimated thousands of gallons of fuel floating on the water table (R. E. Wright Associates, 1983).

The floating fuel is predicted to disperse laterally until capillary forces equal those created by the thickness of the fuel lens. This equilibrium may occur within a few hundred feet of the station's perimeter fence. Free fuel could also be intercepted by drainage ditches in the area, even though there is no indication that this has yet happened. In addition to being a hazard as free fuel, it can be expected to result in the ongoing contamination of ground water. Mitigation is similar to Site 12.

Mitigation has been previously recommended (R. E. Wright Associates, 1983) and POLs are not considered hazardous wastes in Virginia.

2.3.9 Site 15, Abandoned Tank Farm. The site is the old tank farm at North Station. It is located about 800 feet north of Runway 23R. After North Station was decommissioned, the tanks were emptied of fuel and filled with water. Tank G-5 was later used to store waste oil. Although it is no longer used for this purpose, it is thought to still contain about 5,000 gallons of oil. Recent field investigations revealed that small amounts of fuel, now degraded, leaked from the tanks or from their connecting pipelines. The fuel detected is held by capillary action to the soil and there is no evidence of free fuel floating on the water table.

Due to the small amount detected in the field investigation, it is unlikely that significant quantities of the fuel will affect the quality of surface or ground water off the station, thus no confirmation study is recommended.

2.3.10 Site 16, PWD Pesticide Shop. Contamination may have resulted from the washout of pesticide containers and equipment over the life of the pesticide shop. However, eyewitness accounts of the amount of washout waste indicated that this represents only a very small (less than 30 pounds total) amount of material. The washout occurred near the present pesticide shop in the Public Works Compound. The washout material would have entered the ground at the edge of the paved compound and would not have had an opportunity to migrate overland to a surface stream. The closest surface stream is located over 300 meters southwest of the Public Works Compound, and with the very low subsurface gradients in the area, migration would be very slow. The PWD Pesticide Shop Site is not recommended for a Confirmation Study.

3. RECOMMENDATIONS

3.1 INTRODUCTION. Through the process of records searches, interviews and first-hand observations, this Initial Assessment Study (IAS) has identified disposal and spill sites at NAS Oceana. All of the sites identified have been screened through a two-step Confirmation Study Ranking System (CSRS) to systematically evaluate the relative severity of potential risk at the site. The results of the CSRS and a summary of the recommended actions for the sites designated for confirmation studies are listed in Table 3-1.

Six sites pose a potential threat to human health or the environment. Therefore, Confirmation Studies (Phase II of the NACIP program) are recommended for these sites. For sites that warrant cleanup actions but not confirmation studies, specific mitigating measures are proposed. The six sites recommended for Confirmation Study are the following:

- Site 1 - West Woods Oil Disposal Pit,
- Site 2 - Line Shack Oil Disposal Areas,
- Site 5 - Old Static Engine Test Cell Mercury Spill
- Site 7 - Fifth Green Landfill,
- Site 8 - North Station Landfill,
- Site 14 - Fentress Landfill.

The remaining sites are not recommended for confirmation studies.

3.2 CONFIRMATION STUDY RECOMMENDATIONS.

3.2.1 Site 1, West Woods Oil Disposal Pit.

Types of Samples: Ground water
Soil investigation (no samples)

Number of ground water monitoring wells: 3 water table wells to 10 feet below water table (See Figure 3-1 for well locations)

Frequency of Sampling: Ground Water: Quarterly for 1 year

Number of Samples: Ground Water: 12

Parameters to be tested:
Oil & Grease
Volatile organic carbon scan (EPA methods 601 and 602)
Total organic carbon (TOC)
Total organic halogen (TOX)
Chemical oxygen demand (COD)
Xylene
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
PCBs

TABLE 3-1

Summary of Confirmation Site Recommendations

Site No.	Site Name	Map Coordinates	CSRS Score[a]	Number of Wells	Number and Type of Samples	Frequency of Sampling	Parameters
1	West Woods Oil Disposal Pit	12-M	6.35	3	Ground water: two per well at water table surface: both water and oil phases	Once per quarter	Oil and grease volatile organic carbon scan total organic carbon chemical oxygen demand
2	Line Shack Oil Disposal Areas	13-S, 18-R, 15-R, 16-Q 17-Q	20	6	Same	Once per quarter	Same
5	Old Static Engine	14-S	—	0	Composite Soils	Once	Mercury
7	Fifth Green Landfill	17-W	7.93	3	Groundwater: 1 per well Surface water: above, below landfill	Once per quarter	129 Priority Pollutants (Appendix B); Xylene; Methyl Ethyl Ketone; Methyl Isobutyl Ketone
8	North Station Landfill	21-P	4.0	3	Ground water 1 per well	Once per quarter	129 Priority Pollutants (Appendix B); Xylene; Methyl Ethyl Ketone; Methyl Isobutyl Ketone
14	Fentress Landfill	14-A	24.7	3	Same	Once per quarter	129 Priority Pollutants (Appendix B); Xylene; Methyl Ethyl Ketone; Methyl Isobutyl Ketone

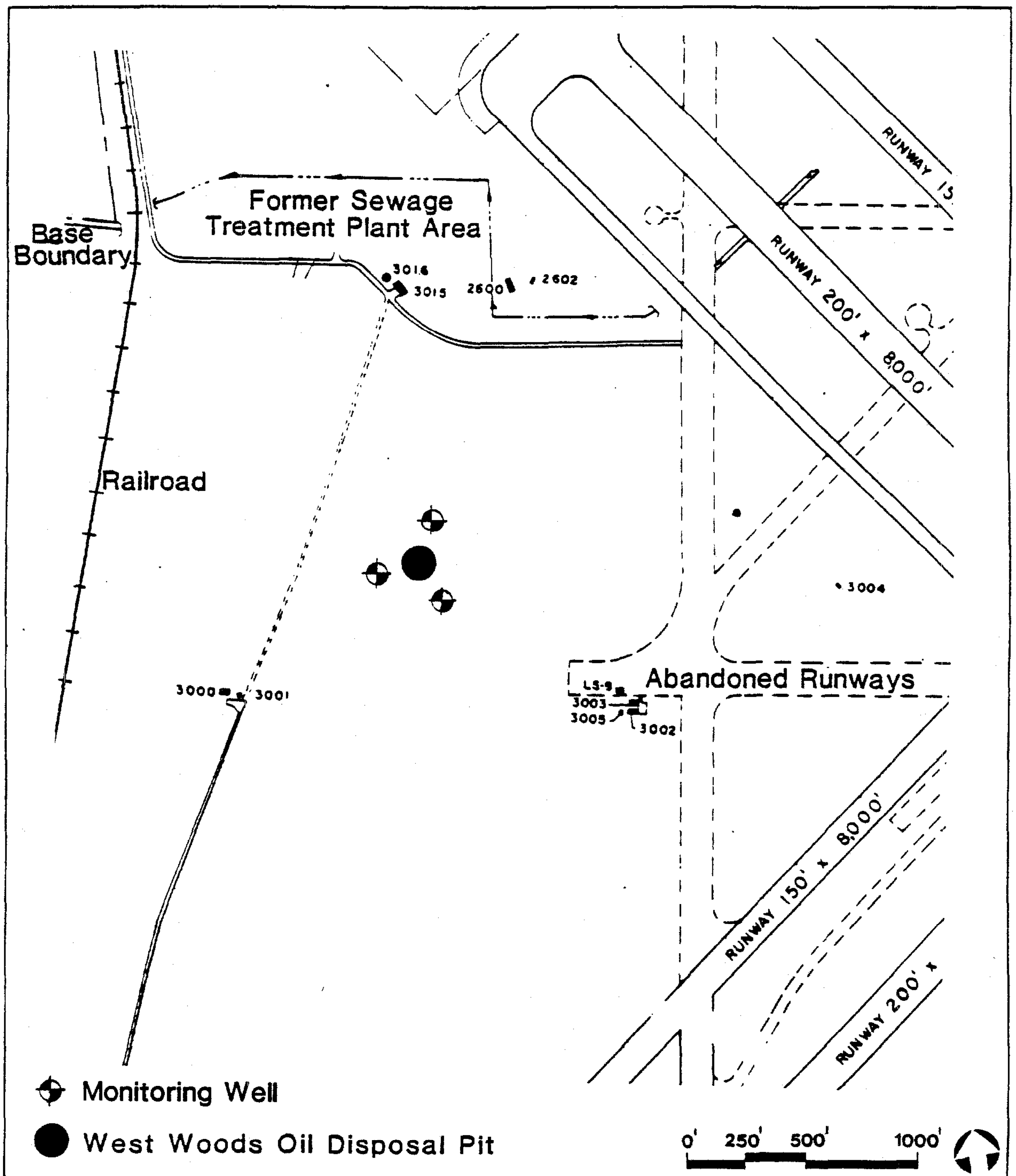

Figure 3-1
Site 1, West Woods Oil Disposal Pit and Monitoring Well Locations

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Initial Assessment Study
Naval Air Station Oceana
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Remarks: The West Woods Oil Disposal Pit received several tens of thousands of gallons of synthetic organic wastes, including POLs and solvents, cleaners, and paints that were discarded with POLs by aircraft maintenance personnel. Most of these wastes are fully soluble in the oil phase and would remain with it in the soil and floating on the water table Some compounds will have a limited solubility in water and slowly be dissolved in ground water.

A soil investigation should be done before the ground water monitoring wells are placed. A backhoe should be used to locate precisely the oil disposal pit based on its location visible on 1958 aerial photographs of the station.

3.2.2 Site 2-Line Shack Oil Disposal Areas.

Types of Samples: Ground water

Number of ground water monitoring wells: Total 6; 3 each water table wells around the two representative disposal areas at Line Shacks 125 and 31 to 33 (Figure 3-2)

Frequency of Sampling: Quarterly for one year

Number of Samples: 24

Parameters to be tested:
Oil & Grease
Volatile organic carbon scan (EPA methods 601 and 602)
Total organic carbon (TOC)
Total organic halogen (TOX)
Chemical oxygen demand (COD)
Xylene
Methyl Ethyl Ketone
Methyl Isobutyl Ketone

Remarks: Two line shack areas were selected as representative of the others for a water quality testing program. Potential disruption of operations and similarity of disposal activities at all five sites leads us to recommend this initially limited program. Evidence of serious contamination by hazardous chemicals of ground water and soil in the vicinity of either of these areas may be the basis to extend the testing program to the others. The wells and tests apply to areas behind Line Shacks 31 to 33 and 125.

The well locations selected are intended to give a preliminary indication of the extent of the contaminated area and the direction of movement of contaminants detected. During installation of the wells, a soil log should be kept that describes any oily wastes encountered. Past experience has indicated that oil saturation of soils near the present location of Building 125 resulted in poor foundation conditions.

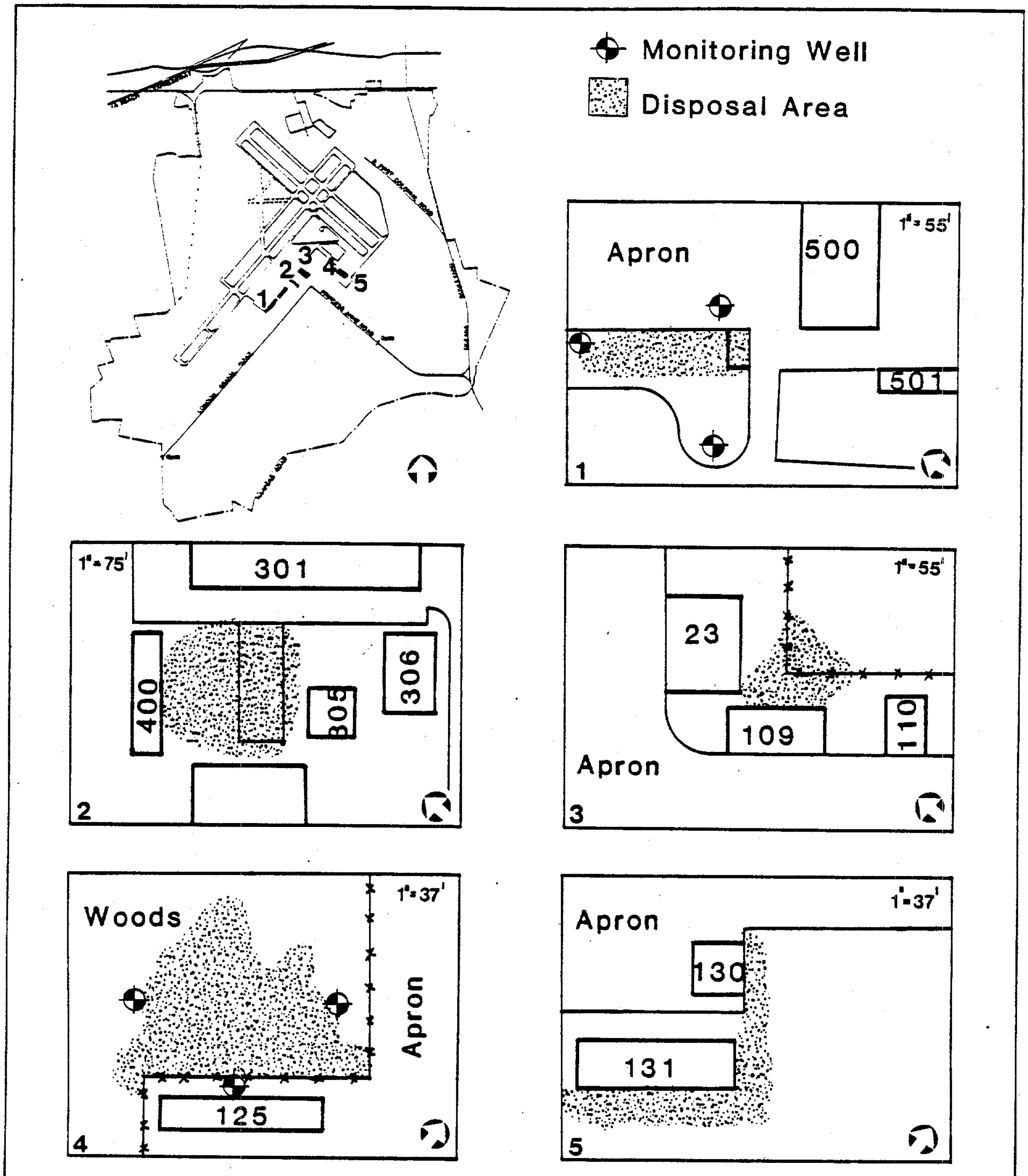

Figure 3-2
Site 2, Line Shack Oil Disposal Areas and Monitoring Well Locations

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Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

3.2.3 Site 5-Old Static Jet Engine Test Cell Mercury Spill

Types of Samples: Floor scrapings: 3
Wood: 1
Ceiling materials: 1
Soils: 3

Frequency of Sampling: Once

Number of Samples: 8

Parameters to be tested: 129 Priority Pollutants (Appendix B)
Total organic halogen (TOX)
Total organic carbon (TOC)
Xylene
Methyl Ethyl Ketone
Methyl Isobutyl Ketone

Comments: It is recommended that the control room of the old static engine test cell in Building 305 be thoroughly cleaned up to remove all detectable traces of mercury. After the cleanup, the control room and test cell should be sealed and monitored for the presence of mercury vapor. Only when mercury vapor concentrations have fallen to safe levels should workers be allowed to enter the building (Figure 3-3).

3.2.4 Site 7-Fifth Green Landfill.

Types of Samples: Ground water
Surface water

Number of ground water monitoring wells: 3

Number of surface water sampling points: 2

Frequency of Sampling: Quarterly for one year

Number of Samples: Ground water: 12
Surface water: 8

Parameters to be tested: 129 Priority Pollutants (Appendix B)
Total organic halogen (TOX)
Total organic carbon (TOC)
Xylene
Methyl Ethyl Ketone
Methyl Isobutyl Ketone

Comments: The Fifth Green Landfill is known to have received almost every type of waste generated at the base. PCBs and pesticides should be tested in both oil and water fractions if they coexist in a sample. The sampling must be done with great care to avoid mixing the water column between samples (Figure 3-4).

A detailed reconnaissance of the perimeter of the landfill is also required to determine if any visible signs of contamination are present. If leachate seepage to the surface is

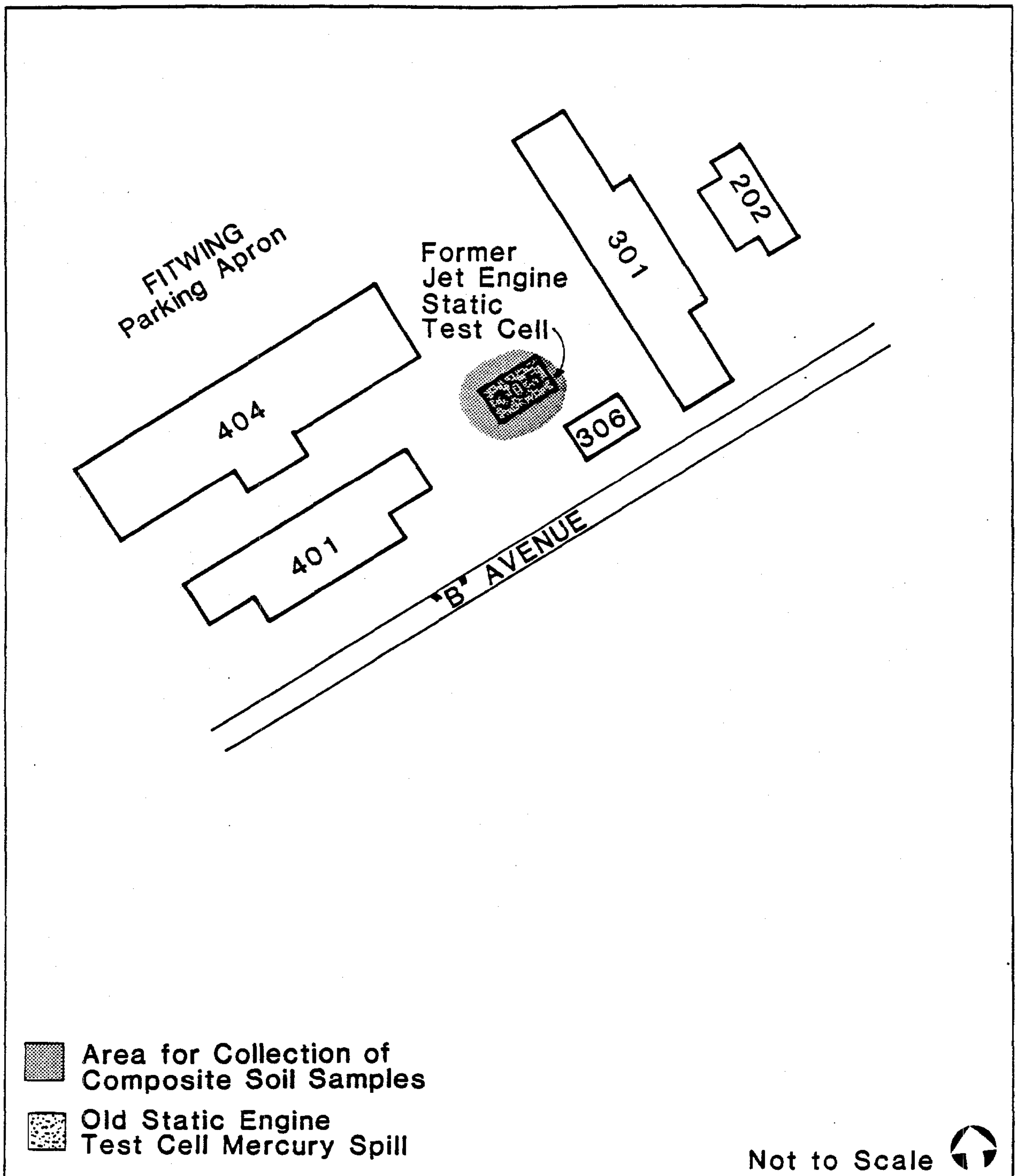

Figure 3-3
Site 5, Old Static Engine
Test Cell Mercury Spill

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Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

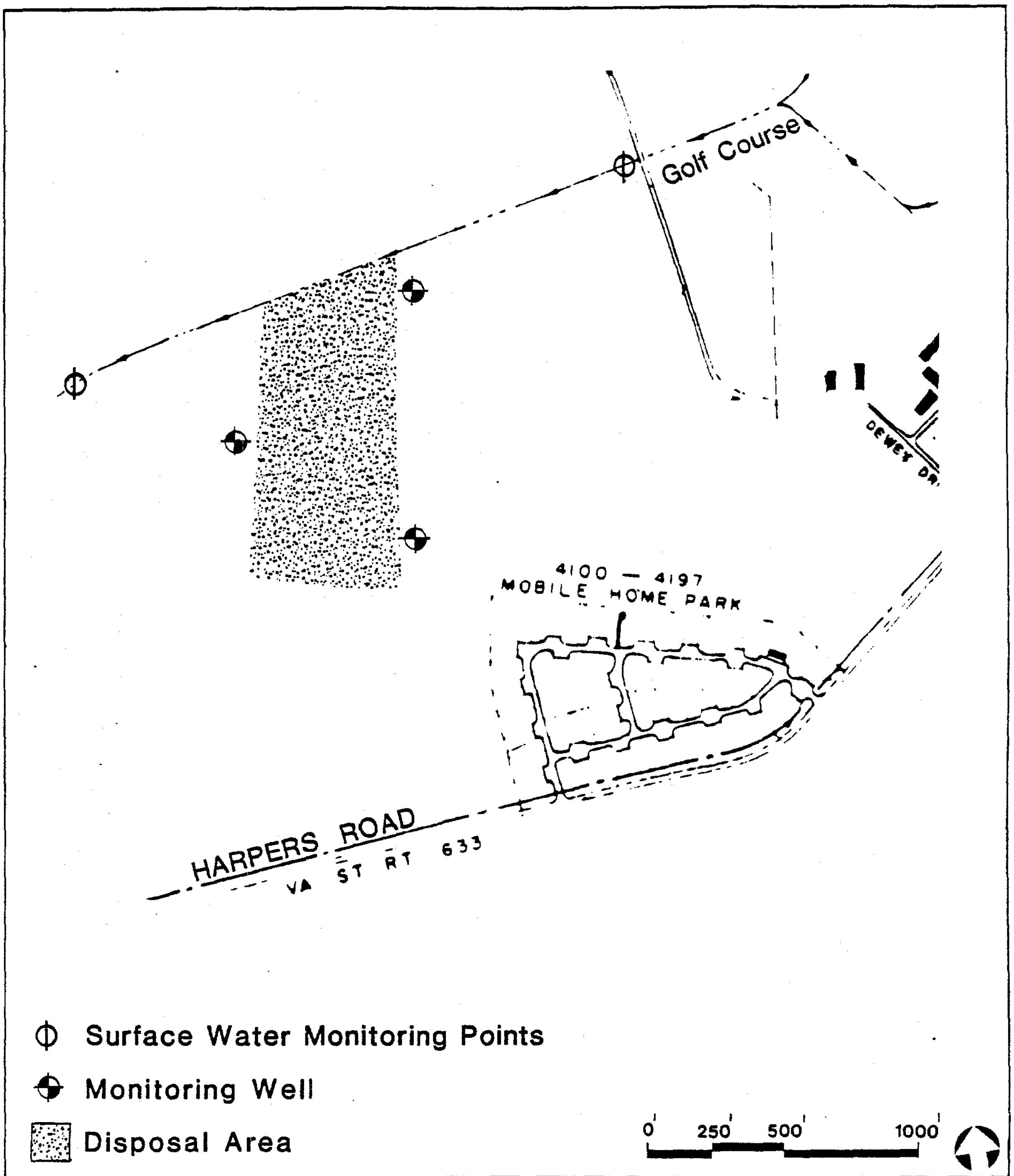

Figure 3-4

Site 7, Fifth Green Landfill Monitoring Well Locations and Surface Water Sampling Points

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observed, it should be sampled. Surface soil samples of oily accumulations or other signs of contaminant migration should be collected during this reconnaissance.

The exact boundaries of the disposal area should also be established during this site reconnaissance. It is especially important to determine how close it is to the drainage ditches that flank it. The surface water samples recommended will determine the extent to which leachate from the landfill is migrating to surface waters.

3.2.5 Site 8, North Station Landfill.

Types of Samples: Ground water

Number of ground water monitoring wells: 3

Frequency of Sampling: Quarterly for one year

Number of Samples: Ground water: 12

Parameters to be tested:
129 Priority Pollutants (Appendix B)
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Xylene
Total organic carbon (TOC)
Total organic halogen (TOX)

Comments: Like the Fifth Green Landfill, the North Station Landfill is known to have received almost every type of waste generated at the base. PCBs, volatile organic carbon compounds, and pesticides should be tested in both water and oil fractions if they coexist in a sample (Figure 3-5).

A detailed reconnaissance of the perimeter of the landfill is also required to determine if any leachate seeps are present. If present, they should be sampled for the parameters listed above.

3.2.6 Site 14, Fentress Landfill.

Types of Samples:
Ground water
Surface water

Number of ground water monitoring wells: 5

Number of surface water sampling points: 2

Frequency of Sampling: Quarterly for one year

Number of Samples:
Ground water: 20
Surface water: 8

Parameters to be tested:
129 Priority Pollutants (Appendix B)
Xylene
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Total organic carbon (TOC)
Total organic halogen (TOX)

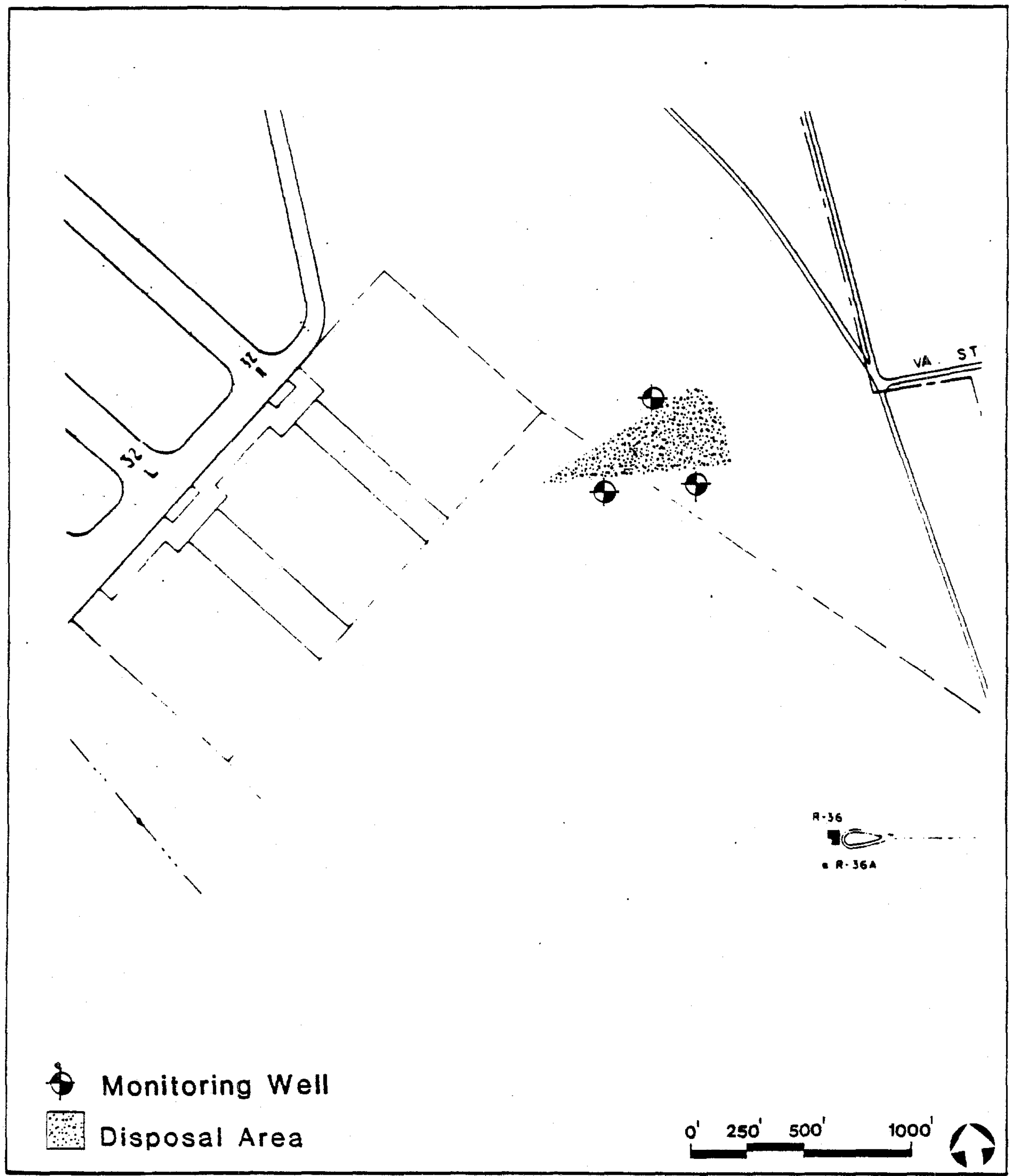

Figure 3-5

Site 8, North Station Landfill Monitoring Well Locations

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Naval Air Station Oceana
Virginia Beach, Virginia

Comments: The greatest hazard from this landfill is the leachates migrating in the ground water to the nearby drainage ditch that parallels the runway at Fentress (Figure 3-6).

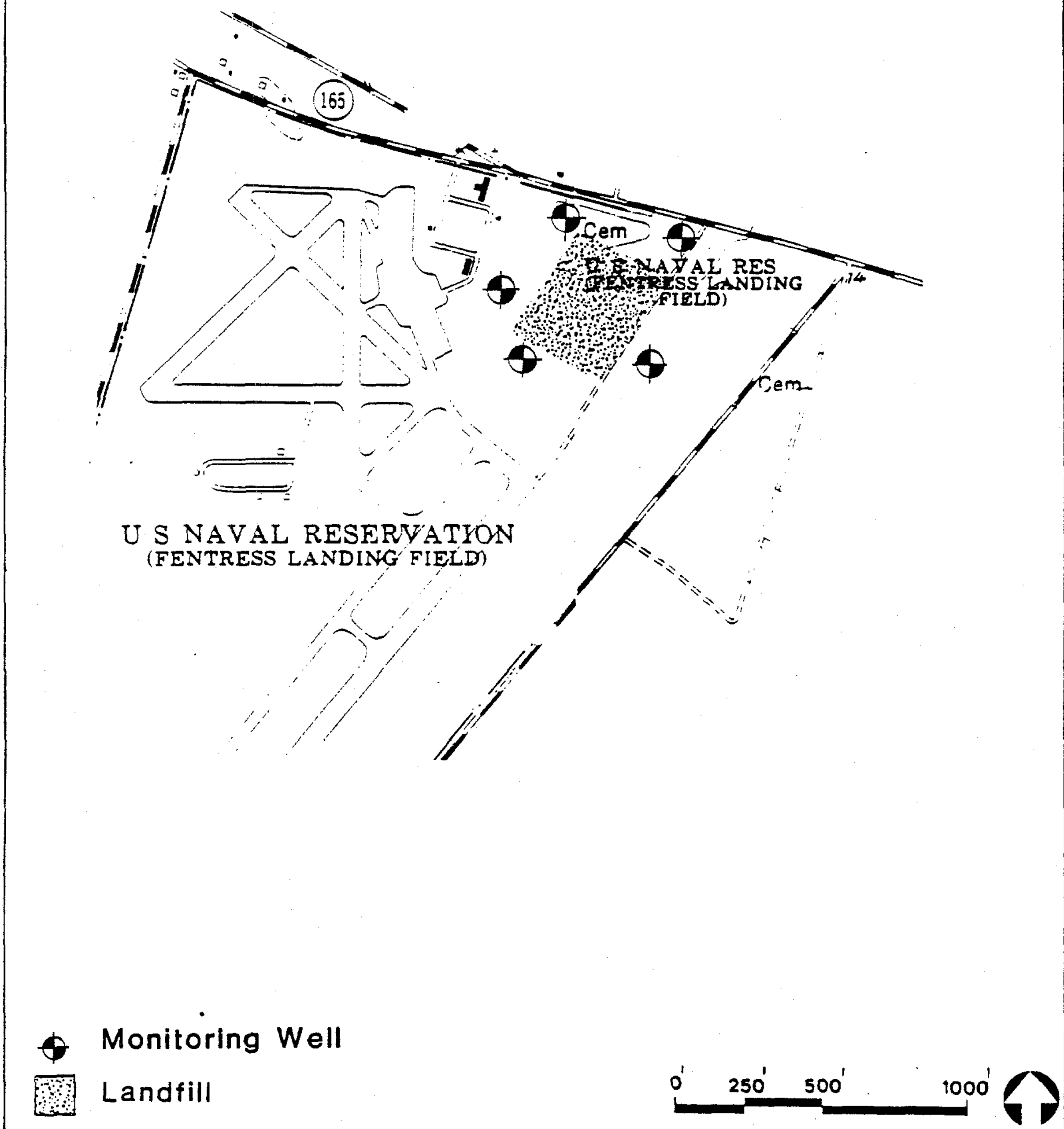

Figure 3-6

Fentress Landfill and Monitoring Well Locations

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Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

4. BACKGROUND

This chapter provides background knowledge of Naval Air Station (NAS) Oceana, its tenant activities, and its associated outlying areas. General background and history are highlighted first; then legal actions are discussed. Biological features, physical features, and migration potential comprise the rest of the chapter.

4.1 GENERAL. NAS Oceana is located in the Tidewater region of southeastern Virginia (Figure 4-1). Bounded on the east by the Atlantic Ocean and on the north by the Chesapeake Bay and James River, this region bases its economy largely on port facilities, ship building and repair, and seafood production, as well as manufacturing, tourism, and agriculture.

The five Tidewater cities of Norfolk, Portsmouth, Virginia Beach, Suffolk, and Chesapeake hosts the greatest concentration of naval power and personnel in the world. Over 60 major commands are located in this area. They include the Atlantic Fleet headquarters, Naval Air Stations Norfolk and Oceana, the Naval Supply Center ("World's Largest Store") and Public Works Center at Norfolk, the Naval Shipyard and Naval Hospital, Portsmouth, Naval Weapons Station, Yorktown, and in the Virginia Beach area, the Naval Amphibious Base, Little Creek, and Fleet Combat Training Center, Dam Neck.

4.1.1 Naval Air Station Oceana. Naval Air Station Oceana is a master jet base occupying over 5,000 acres in Virginia Beach, Virginia (Princess Anne County), about 25 miles east of Norfolk. The base is roughly bounded by the Virginia Beach Expressway to the north, State Routes 632 and 615 on the west and east, respectively, and State Route 633 to the south (Figure 4-2).

Oceana has jurisdiction over the nearby Naval Auxilliary Landing Field Fentress located within six miles of Oceana. The Following environmental description applies equally to Fentress.

The mission of NAS Oceana is to maintain and operate facilities and provide services and material to support Naval aviation and other activities. Over 10,000 Navy personnel and 1,200 civilians work at the Naval Air Station. There more than seven miles of runway aboard the station, and one takeoff or landing occurs every two minutes. The base is home to 23 attack and fighter squadrons and a number of the Navy's most sophisticated high-performance jets: the A-6E TRAM Intruder, the F-4 Phantom II, the A-4 Skyhawk, and the F-14 Tomcat. A Naval Air Maintenance Training Detachment (NAMTRADET) qualifies maintenance technicians to work on these aircraft.

The following shore units are based at NAS Oceana.

COMTACWINGSLANT Responsible for training and readiness of Atlantic Fleet tactical aviation units.

FIGHTER WING ONE Supervises readiness and training of all Atlantic Fleet Fighter Squadrons while at NAS Oceana.
Fighter Squardon 101 - Trains all-weather fighter crews on F-14's.
Fighter Squardon 171 - Trains crews on F-4s (decommissioned after NACIP 1984 site visit).
Fighter Squardon 43 - Trains crews in dissimilar air combat and out-of-control flight.

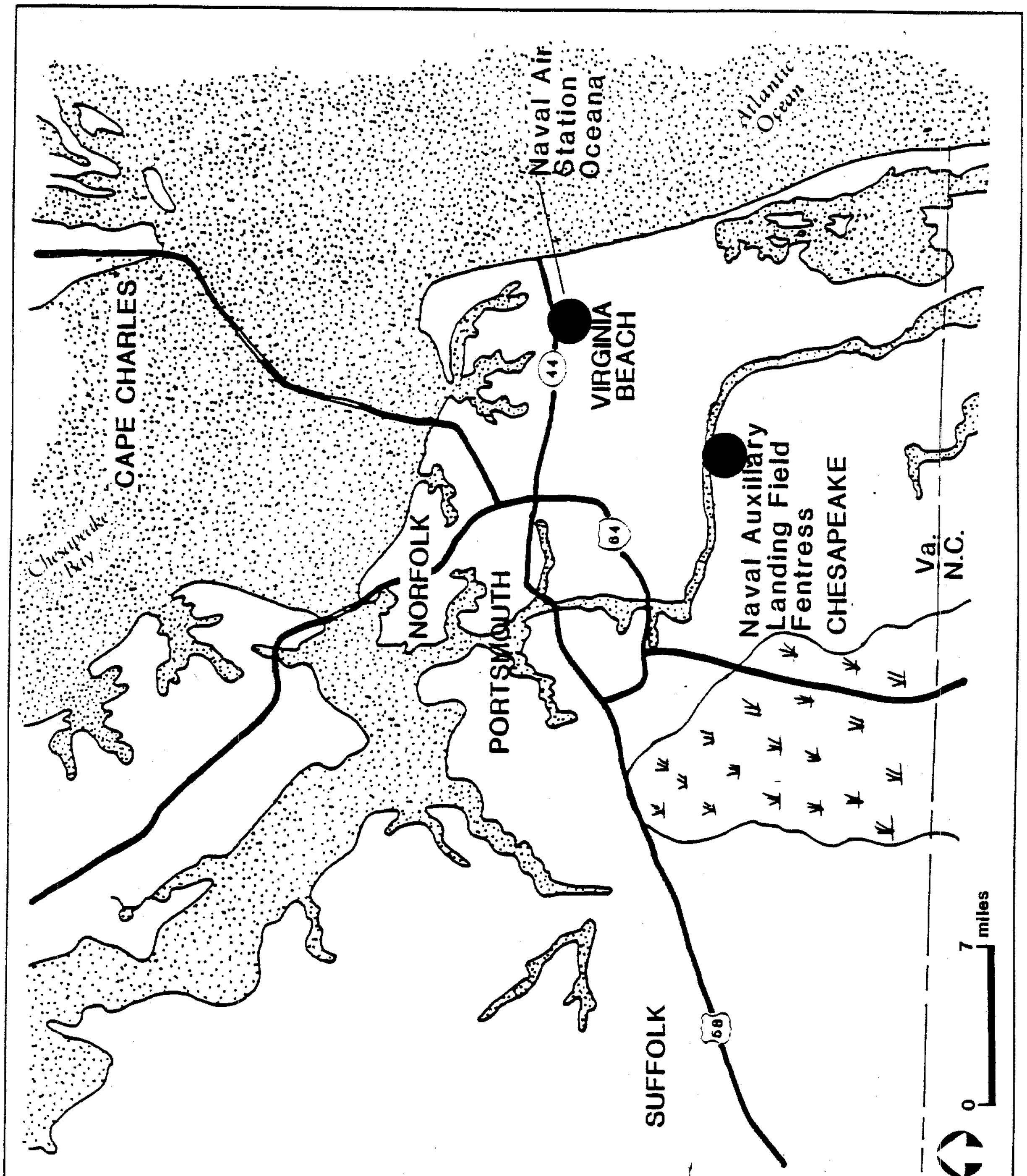

Figure 4-1

Location of Maval Air Station Oceana

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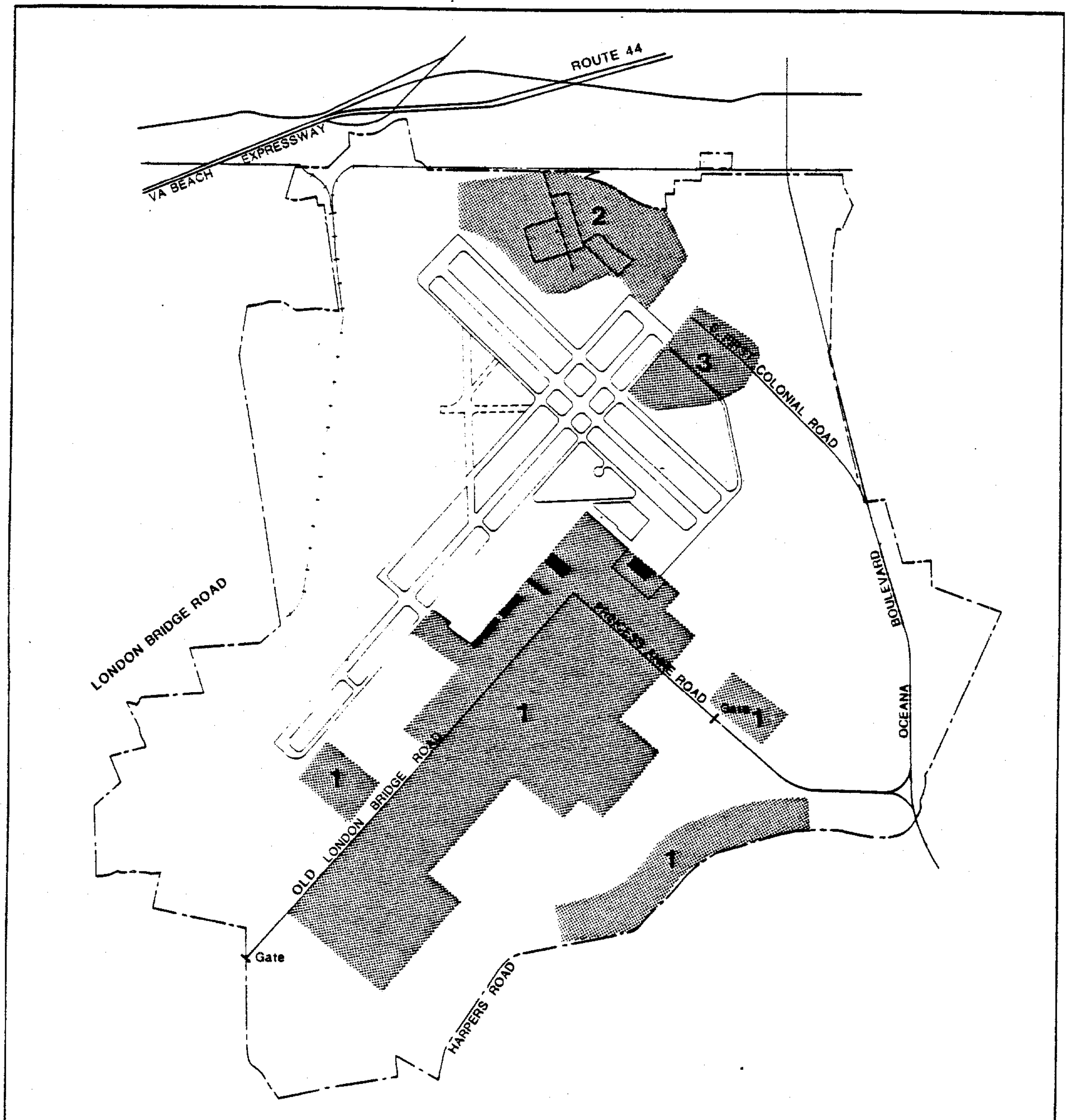
Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia



1 Developed Areas
2 Former USMC Bougainville Area
3 Former North Station Area

0' 2500' 5000'

Figure 4-2
Naval Air Station Oceana

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Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

MEDIUM ATTACK WING ONE — Provides adminstrative support and material management for A-6 Intruder and related squadrons.
Attack Squadron 42 - Trains pilots and bombardier/navigators for Atlantic Fleet A-6 All-Weather Intruder squadrons.
Fleet Composite Squadron 12 - Trains reservists while providing airborne threat simulation for aviation and surface units of the Fleet and the Reserve.

There are also a number of fleet units based at the Naval Air Station.

CARRIER AIR WING ONE
Supports the USS America
Fighter Squadrons 33 and 102
Attack Squadron 34

CARRIER AIR WING THREE
Supports the USS John F. Kennedy
Fighter Squadrons 11 and 31
Attack Squadrons 75 and 85

CARRIER AIR WING SEVEN
Supports the USS Dwight D. Eisenhower
Fighter Squadrons 142 and 143
Attack Squadron 65
CARRIER AIR WING EIGHT
Supports the USS Nimitz
Fighter Squadrons 41 and 84
Attack Squadron 35

CARRIER AIR WING THIRTEEN
New (Spring 1984) wing
Attach Squadron 55

CARRIER AIR WING SEVENTEEN
Supports the USS Saratoga
Fighter Squadrons 74 and 103

Tenant activities at NAS Oceana include the following.

Fleet Area Control and Surveillance Facility, Virginia Capes (FACSFAC, VACAPES) - Schedules use of bombing targets, fleet training areas, service aircraft, and target services.

Naval Air Maintenance Training Group Detachments (NAMTRAGRUDETS) - Trains enlisted personnel in weapons systems and associated equipment.

Fleet Aviation Specialized Operational Training Group, Atlantic Fleet (FASOTRA-GRULANT) - Trains and refreshes Fleet aviation personnel in operational and tactical naval air warfare.

Naval Construction Battalion Unit 415 - Provides military and technical skill to SEABEES.

Detachment 2, 23rd Air Defense Squadron, Tactical Air Command, United States Air Force - Maintains search and height-finder long-range surveillance radars for air defense.

Naval Oceanography Command Detachment (NOCD) Oceana - Provides meteorological and oceanographic support to NAS Oceana and other nearby activities.

As well as the central Oceana location, the Naval Air Station bears the responsibility for a number of outlying areas.

4.1.1.1 Naval Auxiliary Landing Field Fentress. Naval Auxiliary Landing Field (NALF) Fentress is located six miles south-southwest of NAS Oceana in Chesapeake, Virginia. Under the operational control of the Naval Air Station since 1951, NALF Fentress is used as a primary training field for fleet carrier landing practice by operational units based in the area. It averages 80,000-10,000 operations annually for a variety of jet aircraft.

4.1.1.2 Dare County (Navy) Range, North Carolina. The Dare County Range (R-5314) is on land leased from the Air Force since 1964. It lies 14 miles southwest of Mann's Harbor and 24 miles northest of Englebord. The range is the primary range for air-to-ground weapons delivery proficiency practice and can accommodate four aircraft at a time.

4.1.1.3 Palmetto Point Range. The Palmetto Point Range (R-5302) was constructed in 1965. It is on the Albemarle Sound, eight miles northeast of Columbia, N.C. It is used for basic loft bombing, high altitude dive bombing, and rocket proficiency practice and is the main backup for the Dare County Range when that range is closed.

4.1.1.4 Tangier Island Range. The Tangier Island Range (R-6609), established in 1956, lies west of Tangier Island in the Chesapeake Bay, approximately 65 miles north of Norfolk, Virginia. Several targets have been used, and the facility was deactivated in 1970-71. The current target is a former cargo ship located about 2,800 yards from the island. It is used for conventional or loft weapons delivery.

4.1.1.5 Stumpy Point Range. The Stumpy Point Range (R-5313) lies approximately 23 miles northwest of Cape Hatteras in the Pamlico Sound, nine miles southeast of Stumpy Point Bay. The target is a converted LST.

4.1.1.6 Harvey Point Range. The Harvey Point Range (R-5301) is located in the Albemarle Sound approximately 13 miles south of Hertford, N.C. The range is primarily a water mining facility, with a rectangular target area approximately 10,000 by 20,000 feet. A target barge is available for bombing or air-to-surface rocket proficiency practice.

4.1.1.7 Air Combat Maneuvering Range. The Air Combat Maneuvering Range is located off Bodie Island in North Carolina's Albemarle Sound. It was first used in October 1976. Using three towers on land and four on ocean platforms, the range accumulates real-time data on aircraft engaging in combat simulations.

4.1.1.8 Wadsworth Homes. Wadsworth Homes provide 100 three-bedroom junior officer units and 500 three-and four-bedroom units for enlisted personnel. They were taken over by NAS Oceana in 1974. The housing project is located at Camp Pendleton, about three miles from the mail gate.

4.1.2 Adjacent Land Uses. One the west, north, and east of Naval Air Station Oceana are residential and light industrial uses. The area to the south is primarily agricultural, as is the area surrounding NALF Fentress. The Navy is in the process of aquiring restrictive easements or fee title over adjacent and airfield clear zone land at NAS Oceana and NALF Fentress. Land acquisitions began in 1978.

4.2. HISTORY. The earliest probable use of the NAS Oceana site was by nomadic hunter-gatherers of the prehistoric Archaic Period (8000-1000 B.C.) (Naval Facilities Engineering Command (NAVFAC), 1983). From 1000 B.C. until European contact, Woodland Indians inhabited coastal Virginia. More settled than their forebears, these people erected semipermanent villages and farms and exploited marine resources from temporary seasonal camps on the coastal beaches and dunes.

The first English settlers arrived in this part of Virginia in April 1607, and on May 13 chose the Jamestown peninsula for their settlement. In 1635, the Little Creek area was first patented. A tract comprising 5,530 acres from Little Creek to the Lynnhaven River was issued by the Crown to Adam Thorowgood (NAVFAC, 1983). Only marginally useful for agriculture, the land likely served as a range for livestock and a base for beach haul seining (fishing).

By the mid-17th century, Virginia had the largest population in the colonies and had developed a strong tobacco-based economy. The planter aristocracy of Tidewater Virginia supplied many of the emerging nation's leaders, and the colony was a frequent battleground.

Until the Civil War, coastal Virginia remained an agricultural area based on the plantation/slave economy. At that time, Richmond became the capital of the Confederacy, and eastern Virginia again witnessed armed conflict for several years. With the end of the war came the end of the plantation system, and the Tidewater economy shifted to smaller farms and marine resource exploitation. The twentieth century saw the growth of a military establishment in the area, particularly during and after World War II. The Navy now employs about 100,000 men and women in the Tidewater area. With families, retirees, reservists, and civilian employees, the Navy is directly responsible for the livelihood of one-third of the area population.

Land for Naval Air Station Oceana was purchased on 25 November 1940. It began as a 329-acre practice field proposed by the Army as part of the coastal defense system near Virginia Beach. The Navy came into the picture as joint operator of the field, and construction was begun. When the Army changed its plans and left, the Navy completed the facility and made it capable of handling Carrier Air Groups. By 1945, it was an eight-squadron station with three runways.

On August 17, 1943, NAS Oceana was commissioned as an Auxiliary Air Station (NAAS) for NAS Norfolk, which, with Quonset, Rhode Island, was one of the two major Naval Air Stations on the East Coast. Designed to support land- and seaplane operations of reciprocating engine aircraft, neither of these stations could be expanded to support jets, so in 1950 it was decided to expand NAAS Oceana to accommodate the new aircraft.

On April 1, 1952, NAAS Oceana was changed to a Naval Air Station, and became a Master Jet Base. This entailed a major expansion, with the two existing 6,000-foot runways lengthened to 8,000 feet, two new 8,000-foot runways added, 1,000 feet of open zone and a concrete parking apron for 300 planes attached to each runway, and the hangar area expanded to 348,444 square feet. This development allowed the station to handle four Carrier Air Groups and two VC Squadrons.

Construction continued during the mid-1950s to provide the infrastructure necessary to support the air station. Service and maintenance buildings, fuel and POL storage and transfer facilities, a communcations building, supply warehouse, and barracks were all added. The center of the base shifted from the old North Station to the southern end, where expansion space was available. By 1959, the base comprised 5,300 acres.

A runway for supersonic jets (Runway 5R-23L) was added in 1960, a 9.5-mile jet fuel pipeline in 1963, and two high-speed refueling stations near Hangar 122 in 1964. The later 1960s saw chilled air and electrical system installations, the addition of a new pest control facility, and the completion of another hangar. A nuclear weapons loading school was also instituted at NAS Oceana during this time.

In the next decade, the Naval Air Station continued to modernize. The fourth major aircraft maintenance hangar, Hangar 404, was completed in 1974 to support the new F-14 aircraft. In 1975, an engine preservation shop and an airframe maintenance facility were built, and housing at Wadsworth Homes, adjacent to Camp Pendleton, was complete during that year.

By 1976, five of the six Atlantic Fleet Carrier Air Groups were based at Oceana. This year also saw the Fire Department obtain a new foamer, two hangars be repainted, and an electronic cable repair facility be established at NAS Oceana. At NALF Fentress, the high-speed refueling pit became fully operational in 1976.

The latter part of the 1970s involved installation of numerous training devices at NAS Oceana. These included an A6A Cockpit Procedures Trainer, an A4 Operational Flight Trainer, and an F14A Weapons Trainer. A modular automotive-type spray booth gave GSE full stripping and painting capabilities.

Because of water restrictions in 1980, the Public Works Department drilled 7 wells for nonpotable water with which aircraft could be washed and engine test cells operated. Several more trainers were installed in the early 1980s, as well as an electrical test bench for GSE. The fuel farm and AVGAS storage tank were both upgraded.

4.2.1 Historical Sites. There are no known areas of historic or archeological interest on NAS Oceana.

4.3 LEGAL ACTIONS. There have been no legal actions taken against NAS Oceana for violation of environmental laws, according to Legal Services and its Claims Divisions.

4.4 BIOLOGICAL FEATURES

4.4.1 Ecosystems. NAS Oceana and NALF Fentress are located in Virginia's Tidewater Region just inland of the Atlantic coast. Plant communities in these areas are not subjected to the environmental stresses of wind and salt spray characteristic of most coastal areas. Forests tend to be more typical of the Southeastern Evergreen Forest Region (Brown, 1950). Loblolly pine or pine-hardwood forests usually occupy the moist and fertile soils. Areas subject to inundation in this forest region are usually covered by bottomland forests that contain hardwood trees or cypress. These forests vary according to the frequency of flooding and soils type and are usually recognized as either swamp forests, hardwood bottoms or ridge bottoms.

4.4.1.1 NAS Oceana. Most of forest cover on NAS Oceana has been removed to provide space for aircraft runways, and support and administrative operations. Isolated tracts of forest and successionally developing plant communities, however, can be found on the NAS. There are approximately 800 areas of forest and open land on NAS Oceana. Of this total, forests comprise about 600 acres, while 200 acres of open land is suitable for reforestation (NAVFAC, 1980). Most of this land, particularly in the southern part of the NAS, has been ditched to facilitate drainage. Existing vegetative cover, therefore, contains a more mesic (moderately moist) growth then the original plant cover.

Prior to acquisition of the land by the Navy in the early 1940s, the area was used for agricultural purposes and contained scattered tracts of forested land. Large tracts of forest existed both west and south of aircraft runways in 1949. Although hardwoods dominated these woodlands, pine was also present at scattered locations. By 1954, most of the forest south of the runway had been cleared for expanding NAS operations and for agricultural purposes. Approximately half of the forest west of the runway was cleared to improve radio communications. Much of the forested area west of the runways was designated as wetlands on USGS topographical maps (1965). The amount of forest cover currently on NAS Oceana has actually increased since 1954. Most of the forest west of the runways has been reestablished, while small isolated tracts of forest can also be found in areas formerly cleared of their forest cover in 1954. Many of these areas, however, are relatively young and represent shrub or immature woodlands in the early stages of forest succession. In addition, encroaching development, particularly to the north of the NAS, has reduced the amount of agricultural and undeveloped land in adjacent areas.

Much of the NAS contains urban built-up areas such as buildings, roads, and lawns. In addition, large areas adjacent to the runways have been planted in grass. Although these periodically mowed grassy areas provide little value as wildlife habitat, they are important foraging areas for animals such as white-tailed deer, eastern cottontail, and cattle egret.

Most forests on NAS Oceana contain a mixture of loblolly pine and deciduous trees. This mixed forest community is a common cover on moderately drained soils and is among the most mature and stable of the plant communities on NAS Oceana. The topography in these forests is nearly level, often with many isolated water-filled swales. Loblolly pine usually dominates the higher ground, and red maple generally replaces it in the depressions. Other common trees of this forest cover include sweetgum, water oak, and blackgum.

The forested area designated as wetlands on USGS topographical maps (1965) can be expected to contain vegetation characteristic of forested wetlands or swamp. This plant community owes its existence to periodic flooding or a high water table. Typically, red maple and bald cypress would be expected to dominate this plant community, while other species may include black willows, blackgum, and cottonwood. Because the forested wetland is within a larger mixed forest, wildlife inhabiting these two forest covers are probably similar. Typical mammals of these forests include gray squirrel, white-tailed deer, raccoon, red fox, white-footed mouse and beaver.

Successionally developing plant communities are present in a number of areas on NAS Oceana. Most of these areas, however, are located on lands formerly used at North Field and Bougainville. Because these areas have been drained and filled, the present cover contains species characteristics of upland situations. These areas typically contain a variety of grasses, shrubs, and tree seedlings and saplings. These successionally developing plant communities provide habitat for game specicies such as eastern cottontail, American woodcock, bobwhite, mourning dove, and white-tailed deer.

4.4.1.2 NALF Fentress. Vegetation and wildlife on the NALF are described as similiar to that found on NAS Oceana (Naval Facilities Engineering Command, 1980). Prior to the establishment of the NALF in 1943, most of the area had been drained and used for agricultural purposes. Very little forest cover has been allowed to remain on drained sections of the NALF. Most of the area is used for aircraft runway or agricultural cropland or is proceeding through the early stages of plant succession. Swamps border three sides of the NALF and comprise the most important ecological community in the area. Large swamps (Gum and Northlanding River Swamps) along the Albemarle Chesapeake Canal border the NALF to the north and east, while swamps along the Pocaty River and its tributaries (Pocaty River Swamp) are located directly south of the NALF. Although most of these forested wetlands are not on the NALF, portions of Gum Swamp and Pocaty River Swamp are located on military land.

Swamps along the border of the NALF and in adjacent areas contain significant tracts of wetlands and can be expected to provide habitat for a variety of wildlife species. Swamps to the east of the NALF have been designated as a natural area by the Smithsonian Institution, Center for Natural Areas (1975). An area of 11,162 acres is described as a swamp forest of hardwoods and bald cypress that contains flora and fauna typical of the Southeast. A more recent ecological inventory by the U.S. Fish and Wildlife Service (1980) identifies this area as providing important wood duck nesting habitat.

NALF Fentress is located in the southern, less developed section of Chesapeake City. Large areas of swamp and marsh are characteristic of this region. The Great Dismal Swamp National Wildlife Refuge is located approximately 12 miles west of the NALF. About 10 miles southeast of the NALF, the North Landing River flows past the Mackay National Wildlife Refuge.

4.4.2 Endangered, Threatened and Rare Species. Endangered and threatened biota have been designated by the Federal Government and receive protection under the Endangered Species Act of 1973 (Federal Register, January 17, 1979). The State of Virginia also officially recognizes endangered species designated by the United States. In addition to officially recognized species, there are a number of plants currently under review as potential endangered or threatened species (Federal Register, December 15, 1980 and November 28, 1983).

According to the NAS Oceana Master Plan, there are no endangered species on either NAS Oceana or NALF Fentress (NAVFAC, 1980). The following three species reside or migrate through southeast Virginia, however, and could potentially be found on the two Naval facilities.

Falco peregrinus (Peregrine Falcon). Endangered (Resident and Migrant Bird). The arctic peregrine falcon can be found in coastal areas during migration, particularly in September and October. In addition, hacking stations (partial confinement and bedding areas) have been established for the American peregrine falcon on the Eastern Shore and at Back Bay National Wildlife Refuge, and this bird may eventually be reintroduced into the region.

Heliaeetus leucocephalus (Southern Bald Eagle). Threatened (Resident Bird). Virginia provides prime habitat for the southern bald eagle. In 1978, 37 active nests were located in the state and productivity was 0.49 fledglings per active nest. Although productivity has improved greatly when compared with the low point in 1963 (0.19 fledglings per active nest), the Virginia bald eagle population is not reproducing at a level adequate to sustain the population. There are currently no bald eagles nesting in area. Some birds, however, do winter along area beaches or pass through the region during migration.

Picoides borealis (Red-Cockaded Woodpecker). Endangered (Resident Bird). This woodpecker is a highly specialized bird that nests only in pines afflicted with red heart fungus. Among woodpeckers, the red-cockaded has an advanced social system and are known to live in a group or clan of two to nine birds. This woodpecker has not been seen in the region in two to three years. The last sightings were east of NALF Fentress in the vicinity of Pungo.

4.5 PHYSICAL FEATURES.

4.5.1 Climatology. The climate of the Tidewater area is characterized as oceanic, with the nearby Atlantic Ocean and Chesapeake Bay providing a profound moderating effect. Winters are relatively mild and summers are cool. Average daily temperatures in July range from 75-87°F. Winter temperatures seldom reach the freezing mark and daily highs are near 50°F. The maximum temperature recorded over a 40-year period (1939-78) was 103°F.; the minimum, 5°F.

The average number of frost-free days per year is 245. The first killing frost occurs around November 21, and the last, around March 21. Based on the 40-year data record at Norfolk International Airport, annual precipitation averages 45 inches, with the heaviest precipitation in the summer. Snowfall averages 7.3 inches per year.

Prevailing winds from the southwest average 12.2 mph. Summer winds are "sea breezes", coming in off the ocean during the day, with land breezes returning more slowly at night. Neither northern nor tropical storms usually affect the area, but hurricanes are experienced about once every seven years (NAVFACENGCOM, 1983).

4.5.2 Topography. NAS Oceana is located on the outer edge of the Atlantic Coastal Plain physiographic province. The Atlantic Coastal Plain is a broad, seaward-thickening wedge of sediments, with an overall surface slope toward the Atlantic Ocean. The inner portions of the coastal plain step down in elevation in a series of linear eastward-facing scarps which represent the shoreline during older, higher stands of sea level. In contrast, the outer coastal plain is characterized by low elevations and relief.

Elevations at NAS Oceana range from about 5 feet above mean sea level in the drainage ditches to about 25 feet in the open fields. The elevations in the main base area range from about 10 to 25 feet on the average. In general, there is a shoreward slope to the surface in this area, with local relief provided by the natural and artificial drainageways. AT NALF Fentress, elevations in the northern wetlands range from 5 feet to mean sea level. On the runway and near the other Navy facilities, elevations from 10 to 15 feet above mean sea level are more common.

Drainage of both sites is aided by a system of surface canals which were created for this purpose. Most of the developed land in this section of the Atlantic Coastal Plain requires such drainage improvement to be made useful.

4.5.3 Geology. The Atlantic Coastal Plain in the Four Cities area is underlain by several thousand feet of unconsolidated sand, clay, and some gravel (Figure 4-3). The deposits range in age from lower Cretaceous (the end of the age of dinosaurs) to Recent. They represent an almost continuous sequence of deposition of the various sediment sizes into this Atlantic Coastal basin. From oldest to youngest, the six geologic units in the area are the Patuxent Formation, "transitional beds", the Mattaponi Formation, the Calvert Formation, the Yorktown Formation, and the Columbia Group. These units range from 2,000 to 4,000 feet in thickness in the vicinity of NAS Oceana. While the framework of the basin is generally understood through the use of logs of boreholes and wells, much more information is available for the topmost several hundred feet.

The details of the sediment layering in the Yorktown Formation and the Recent deposits are more clearly understood than those of deeper strata. This is because these shallower strata have been explored more thoroughly by boreholes and wells and other testing than the deeper strata. In this area, there are three distinct and mappable sand and gravel units recognized within the Yorktown Formation. Each of these is an aquifer, in that it is capable of delivering a usable quantity of water to properly constructed wells. The Columbia group sediments also constitute an aquifer in this area.

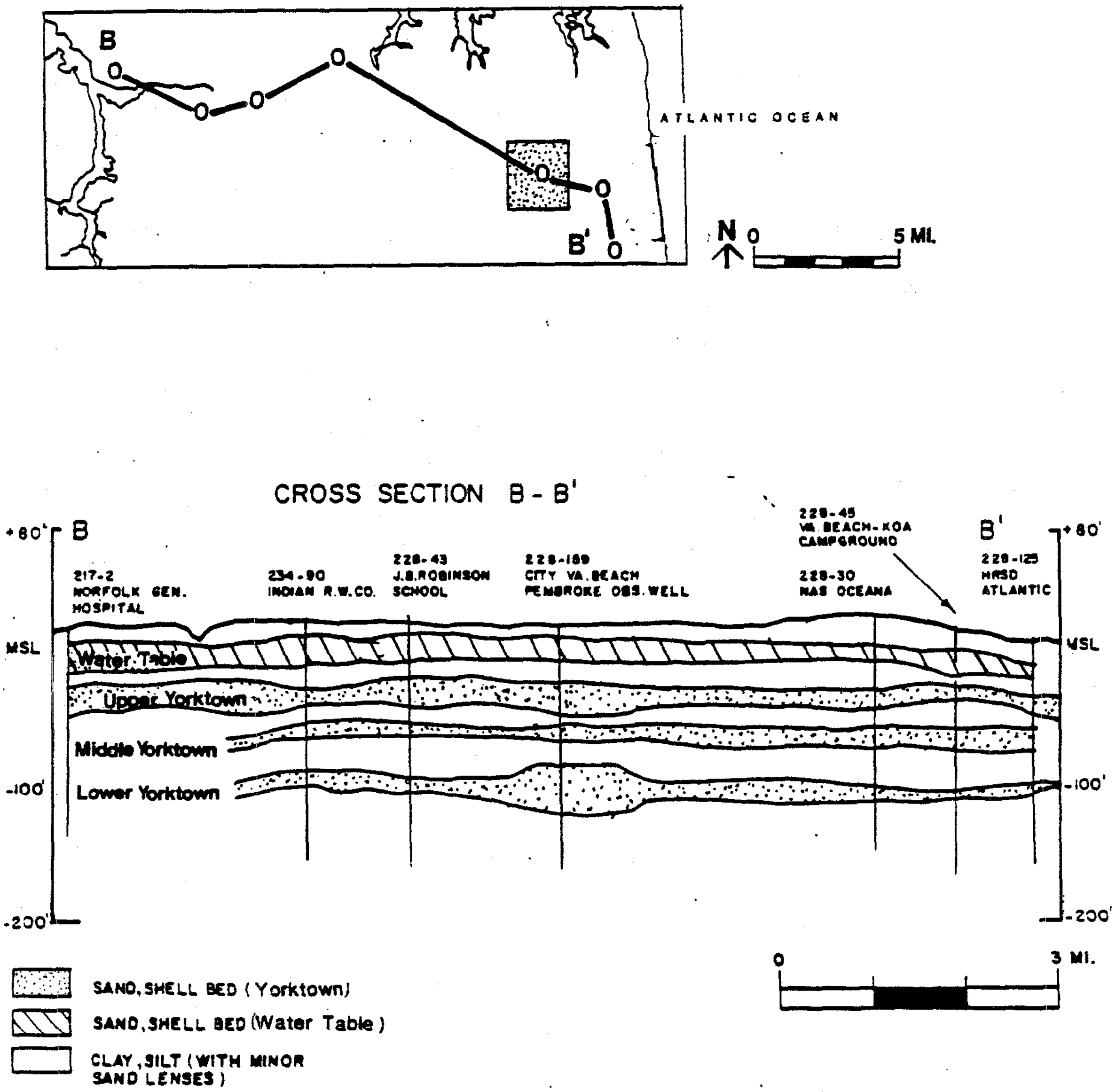
In the cross section shown as Figure 4-4, the Columbia Formation sediments occupy the top 30 to 40 feet, extending to approximately 20 feet below sea level. Confining layers of silt and clay (shown in white) separate the Columbia from the three Yorktown strata as well. This complex of sand, silt, and clay strata extends to approximately 100 feet below sea level. It constitutes the area of concern for land disposal activities. Hydrologic details of these strata are discussed in Section 4.5.5.

4.5.4 Soils. The mapping of agronomic characteristics of the top five feet of soil on the earth's surface has progressed through the Four Cities Tidewater region. Soils types may be significant aspects of the Navy Assessment and Control of Installation Pollutants (NACIP) investigation because of the ways in which soil chemistry can affect the migration potential of contaminants. However, as cited above, much of the solid ground at NAS Oceana and NALF Fentress has been modified during the improvement of an efficient surface drainage system.

Since most of the Oceana base has been graded, filled, paved, or otherwise disturbed, predicted soil characteristics from mapping of agronomic soil types is of limited use. Cation exchange capacity, adsorption, or other forms of potential contaminant attenuation cannot be predicted on the basis of this mapping. Dilution of contaminants may, however, be expected as a result of the coarse granular texture and high coefficient permeability of the soils (estimated at from 0.01 to 3 centimeters per second).

Unlike NAVPHIBASE Little Creek, little fill from offsite was needed to grade the base. A large borrow pit located along the Colonial Highway in the northeast corner of the site was used for site grading during the major expansion in the mid-1950s which accompanies the move of facilities from the North Station area to the present base.

The soils survey of the area notably divides the native soil types on the basis of drainage and water table characteristics, rather than by classical soil profiles and weathering of the parent rock materials. This is a most pragmatic approach to the mapping in this area. The divisions include the following:



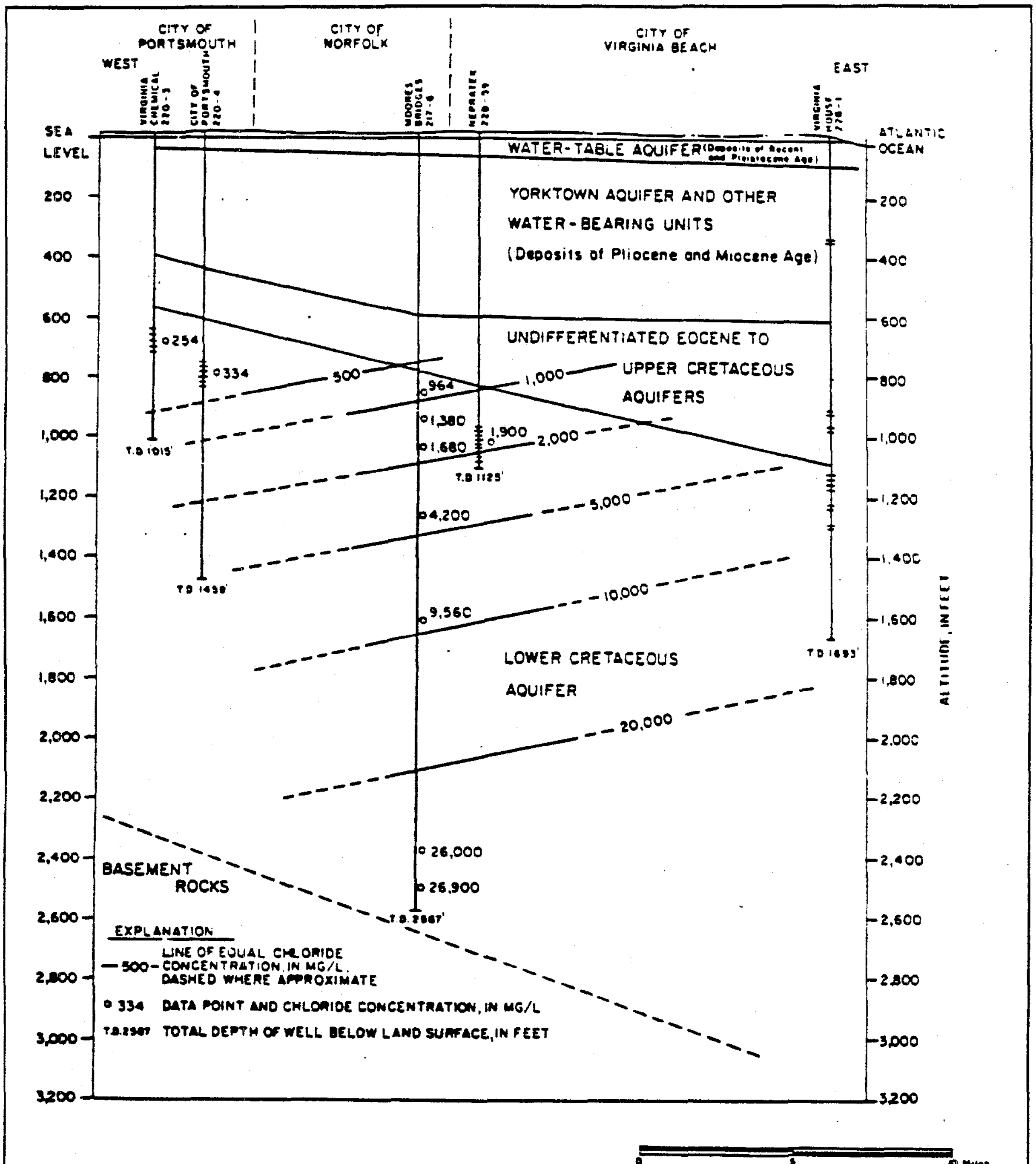
Source: Sidulya et al., 1981.

Figure 4-3

Hydrogeologic Cross-Section of Four Cities Area

Rogers, Golden & Halpern

Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia



Source: Sidulya et al., 1981.

Figure 4-4

Hydrogeologic Cross-Section Showing Chloride Distribution in Lower Cretaceous Aquifer

Rogers, Golden & Halpern

Initial Assessment Study
Naval Air Station Oceana
Virginia Beach, Virginia

- o well-drained
- o imperfectly drained,
- o light-colored poorly drained,
- o dark-colored poorly drained, and
- o miscellaneous.

Soils have thus not been considered in detail for the evaluation of pathway potentials in this report because of the potentially high variability between adjacent areas of fill, because of the short pathway distances to adjacent surface and ground water bodies, and because the disposal method in many instances was below grade. The implications of soil texture, surface drainage, and depth to water table have been considered, as discussed in subsequent sections.

4.5.5 Hydrology.

4.5.5.1 Surface Water Hydrology. Surface hydrology at NAS Oceana is controlled by the very low surface gradients and the drainage improvements associated with the development of the site. Current surface drainage from the main base area is predominantly toward the southwest. Other, smaller portions of the base drain toward the northeast and the west. These minor basins drain relatively small portions of the site. Each surface discharge from the base property is a permitted NPDES outfall, is monitored twice daily, and the discharges are routed past a boom-type oil/water separator, which are maintained regularly.

4.5.5.2 Ground Water Hydrology. Ground water hydrology is controlled closely by the drainage features mentioned above, but with the amount of disturbance and filling which the base has experienced, the exception to that rule should be expected. Ground water surface gradients are gradual (on the order of 1 to 2 feet per mile maximum), because there is little relief available and the materials have a relatively high hydraulic conductivity (estimated 0.01 to 3 centimeters per second).

The shallowest water-bearing zone that may be affected by surface or shallow disposal practices extends from the ground surface to about 20 feet below mean sea level. The Columbia group sediments that are exposed at the surface accept a high proportion (approximately 50%) of the precipitation which falls on the earth as recharge. Of this 50%, aproximately 22% is lost to the atmosphere via evapotranspiration and 78% recharges the water table. In this area, the water table is under atmospheric pressure conditions (water table aquifer) and is typically found just a few feet above sea level. No known potable supply wells were identified within one mile of the base. Some limited use of the water table aquifer for watering shrubbery and lawns does occur in the area. Water quality limitations in the water table aquifer include high chlorides, low pH, and high iron content.

Deeper water-bearing strata of the Yorktown Formation may be affected by surface disposal or spillage activities. Formations that occur below the Yorktown Formation are not a factor in the present study. This is because of the protecting influence of the Yorktown silts and clays and the brackish water quality of those deeper formations.

Three water-bearing units of the Yorktown Formation are qualified as aquifers on the basis of their ability to provide an adequate supply of water to properly constructed wells (Figure 4-3). The Yorktown is the major potable aquifer of the region. It is found at depths of approximately 50 to 150 feet below the surface, making it a practical source even for smaller supplies. The Yorktown consists of several thin units and lenses composed of sand and shell and separated by silt and clay units. Water is transmitted readily through the sand and shell units, while it moves much more slowly through the silt and clay. Water yields in the Yorktown are highly variable. The larger well yields are on the order of 50 to 75 gallons per minute. To develop a large supply in the Yorktown aquifiers, one would thus have to rely on numerous widely scattered wells rather than several centrally located ones.

Water in the Yorktown aquifiers is found to be under very close to water table conditions. The results of well testing in several parts of the Four City area indicated that the upper Yorktown aquifers at least may be classified as leaky artesian aquifers with a slight upward head (and flow) under present pumping conditions. This suggests that under the present pumping conditions a slight upward flow from the Yorktown aquifers into the Columbia formation is occurring, and that contaminants released at or near the surface would not likely have an effect on the Yorktown units.

Water in the Yorktown aquifers is generally suitable for potable purposes. Water quality varies significantly and in unpredictable patterns. Some of the quality parameters which vary the most radically are listed below:

Hardness	1	- 1,430	milligrams/liter (mg/l)
Iron	0.1	- 48	mg/l
Chloride	6	- 2,000	mg/l
Total Dissolved Solids	77	- 4,110	mg/l

The combination of generally low but highly variable yields and highly variable chemical quality are ample reasons why the Yorktown aquifers are not used for domestic supplies in the area. Large supplies of readily available surface water have also alleviated the need to develop these resources.

4.6 <u>Migration Potential.</u>

4.6.1 Pathways. Air is not an important pathway for the older, discontinued disposal practices which are the subject of the Naval Assessment and Control of Installation Pollutants program. Most of the contaminants which could have adverse effects on their receptors via the air pathway have long since abated or degraded in concentration below levels of concern. While disturbance of a waste disposal area might renew the concerns for air pathways, these pathways alone are not considered to be sufficient to cause a site to be considered for a Confirmation Study. Pollutant sources which may have a significant aerosol fraction will be considered as part of the work plan for Confirmation Study sites.

Surface water pathways, like the site drainage ditches and the streams which they feed, are very important in the Tidewater area because there is so much surface water available and because it is virtually impossible to dispose of any material on land that is not close to a surface water body. Once in the surface water environment, rapid migration and dilution of the contaminants is characteristic. However, in the environment of the chemical transition from fresh to salt water, it is also possible to immobilize, and in some cases even concentrate, specific chemical species. Typically, the fine-grained bottom sediments in areas of industrial activity like this are the repository for a portion of the contaminants that enter them. When the sediments are disturbed by activities like dredging or during a storm, some of the contaminants trapped in them may be released. The contaminants may enter the food chain after ingestion by marine organisms which feed on the bottom sediments, for example.

The ground water pathway is the one which is usually the first to be affected by a source of contaminants due to land disposal of wastes. It is of particular concern because it provides a source of potable water in many areas, it is very hard to restore to higher quality conditions, and the details of its hydraulics, hydrodynamics, and chemistry are not well understood. What is understood is that the ground water table is shallow; the gradients which drive the water through the soils are not steep; and the soils through which the ground water passes are a combination of coarse granular soils, which have a relatively high hydraulic conductivity (permitting rapid migration), and fine-grained organic soils, which have low hydraulic conductivities and present more opportunity for geochemical reactions with contaminants. The net effect of these conditions is that one would not expect that disposed liquids or dissolved contaminants leached off the solid waste components would remain in the area for significant periods of time. In a matter of years, or perhaps a decade at most, most of the soluble and liquid fractions of the disposed wastes would not be found in the ground water at the site. Furthermore, once the ground water carrying these liquid components dishcarged to the surface water bodies, the concentrations of any contaminants would be dispersed and diluted to the point that remedial actions would not be practical.

5. WASTE GENERATION

5.1 GENERAL. Oceana had its beginnings in Princess Anne County in the early 1940s as an auxiliary landing field for the Naval Air Station, Norfolk, Virginia. It expanded during World War II and in 1952 was designated a Naval Air Station (NAS). This designation resulted in a major runway and aircraft support facility construction program between 1952 and 1956. Since then, most of its operational functions have remained the same. However, waste generation at Oceana generally increased over the years in response to its expanded capabilities to service carrier-based jet aircraft in the mid-1950s and the growth in the Air Intermediate Maintenance Department in the 1960s and 1970s.

Past and present operations generating hazardous waste are discussed in this section by department, division, branch, and shop. Oceana's auxiliary landing field at Fentress is also discussed here. Due to personnel changes, particularly in the squadrons, only a limited amount of information on past operations was available for presentation in this section.

Much of the petroleum, oil, and lubricant (POL) wastes generated at Oceana result from the operation and maintenance of aircraft squadrons rotated between aircraft carriers and NAS Oceana. In addition to a training fighter squadron and one fleet squadron permanently assigned to the air station, there are 19 temporarily based squadrons assigned to Oceana, of which up to 12 can be accommodated at Oceana at any one time. This presentation reports waste generation by a typical fighter and fleet squadron, taking into account the average proportion of time they are using Oceana facilities.

Hazardous waste disposal pathways in the immediate past are fairly clear. In late 1981 the Public Works Department initiated its comprehensive hazardous waste pickup program, working closely with the various shops at NAS Oceana to assure that wastes are properly contained, segregated, labeled, and collected. POL wastes continue to be placed in waste oil bowsers prior to their being transported to the fuel supply yard with other wastes collected separately. All waste POL is burned by the Fire and Rescue Division in its fire fighter training exercises.

Before 1982 most aqueous hazardous wastes were disposed by rinsing them into the sanitary sewer. Minor quantities, in some cases, were disposed on the ground.

Between 1977 and 1982, most POLs and other non-aqueous hazardous wastes generated by aircraft support shops were disposed together in the waste oil bowsers. The Fire and Rescue Division burned these mixed wastes.

Before 1977 hazardous waste disposal practices can only be stated in very general terms due to a lack of base personnel with specific knowledge of them. Waste POLs and other non-aqueous hazardous substances were collected for use by the Fire and Rescue Division (early 1960s to 1977), for disposal in the West Woods oil disposal pit (mid 1950s to late 1960s), for application to roads for dust control, or for storage and pickup by private waste oil dealers. Prior to 1977 waste POL and other hazardous wastes, both aqueous and non-aqueous, were also disposed into storm and sanitary sewers and on the ground near aircraft maintenance shops, particularly behind the line shacks. The latter practice has been largely eliminated since then by better housekeeping practices and the availability of waste oil bowsers. However, there are signs that wastes are still being disposed to the ground near the line shacks.

Table 5-1 summarizes the wastes generated at NAS Oceana and NAF Fentress as described in this chapter. The amount, period of disposal, and disposal mode or distination are listed for each waste generated. If a waste was landfilled, it is assumed that it was placed in the landfill active at the time of its generation (see Table 6-1). The WFUEL designation used in the Disposal Mode column refers to the waste oil bowsers used to accept waste POL and other hazardous wastes for disposal as discussed above.

5.2 PUBLIC WORKS DEPARTMENT. The Public Works Department operates, maintains, and repairs all public works and public utilities at NAS Oceana. The Public Works compound occupies Building 820 (administration and maintenance shops), Building 830 (transportation shops and yard), and Building 921 (utility shops). It has occupied these structures since their construction in 1957, 1954, and 1959, respectively. Previously, Public Work shops and storage buildings were located in several buildings in the North Field area. The center of the old public works area is about 1,300 feet NNW of the end of Runway R23. The old public works buildings were demolished in the late 1950s and early 1960s.

There are three divisions under the administrative control of the Shops Engineer: Maintenance, Transportation, and Utilities. These three divisions generate a variety of hazardous wastes and are responsible for the transportation of solid and hazardous wastes to the base landfill or the hazardous waste storage area.

5.2.1 Maintenance Division. The Maintenance Division of the Public Works Department maintains all buildings, grounds, and ground structures as well as public utilities, (including electric, water, steam, air, gas, fuel oil, sanitary sewers and refrigeration units), except that assigned to the Utilities Division. Other responsibilities include the collection of garbage, trash, and refuse, and the application of insect and rodent control measures.

5.2.1.1 Metal Trades Branch. Metal trades includes machine, piping/insulation, welding, and metal shops. These shops perform repair and installation work for the base.

The machine shop manufactures and repairs metal parts for Oceana facilities. The shop has used Agitine as a parts cleaner for over 15 years in a 35-gallon batch tank, which has been cleaned about three times per year on average. Waste Agitine is now drained into empty barrels and removed by Public Works hazardous waste pickup. It was usually placed in a bowser and spread on local roads for dust control before 1982.

The pipe shop performs repairs and insulation on base pipe systems and strips, and bags and disposes of asbestos insulation found during repair work. Since 1980 waste asbestos has been double-bagged and placed in a special asbestos landfill just to the northeast of the Avenue D landfill. Prior to that, asbestos was discarded in whatever landfill was active at the time. Asbestos from incoming pipe work orders has been wetted, stripped, and bagged for disposal at the asbestos landfill since 1980. Stripped asbestos went to the base landfill before 1980.

Cutting oils are used for threading pipes and are disposed of with metal scrap. Less than 2 gallon/year of waste oil are drained from the shop air compressor and picked up by Public Works hazardous waste disposal. This oil was put in the Public Works bowser for dust control before 1981.

Table 5-1

Waste Generation at NAS Oceana

Activity	Waste	Generation Rate Per Year		Duration	Disposal Mode*
I. Public Works Department					
A. Maintenance Division					
(1) Metal Trades	Agitine	100	Gal	69 - 81	WFUEL
		100	Gal	82 - 84	PWHWP
	Air Compressor Oil	2	Gal	41 - 81	WFUEL
		2	Gal	82 - 84	PWHWP
	Asbestos	200	Lbs	45 - 79	LNDFL
		2,000	Lbs	80 - 84	ALF
(2) Building Trades	Waste Paint	110	Gal	41 - 81	LNDFL
		110	Gal	82 - 84	PWHWP
	Waste Paint Thinner	120	Gal	41 - 81	LNDFL
		120	Gal	82 - 84	PWHWP
(3) Pest Control Shop	Pesticide Tank Rinse	150	Gal	41 - 81	GROUND
		150	Gal	82 - 84	PWHWP
	Pesticide Residues	16	Lbs	41 - 81	LNDFL
		16	Lbs	82 - 84	PWHWP
(4) Heating, Ventilation, and Air Conditioning Shop	Freon 11	20	Gal	82 - 84	PWHWP
	NaOH and NaBO3 (.005% solution)	50,000 - 100,000	Gal	54 - 84	GROUND

*Key on page 5-12

Table 5-I

Waste Generation at NAS Oceana

(Page 2)

Activity	Waste	Generation Rate Per Year		Duration	Disposal Mode
B. Transportation Division	Paint & Thinner	20	Gal	41 - 81	LNDFL
		20	Gal	82- 84	PWHWP
	Varsol (Kerosene	120	Gal	41 - 81	WFUEL
	Base)	120	Gal	82 - 84	CNTRCT
	Waste Motor Oil	2,000	Gal	41 - 84	WFUEL
	Antifreeze (Ethylene Glycol)	1,000	Gal	41 - 84	SS
C. Utilities Division	Diesel Oil	12	Gal	53 - 84	PWHWP
	Air Compressor Oil	180	Gal	73 - 81	GROUND
		180	Gal	82 - 84	WFUEL
	Trisodium Phosphate	500	Lbs	53 - 84	SS
	Sodium Sulfite	300	Lbs	53 - 84	SS
	Diethanolamine	300	Gal	53 - 84	SS
	Southeast Labs 1101	300	Gal	53 - 84	SS

Table 5-1

Waste Generation at NAS Oceana

(Page 3)

Activity	Waste	Generation Rate Per Year	Duration	Disposal Mode
2. Special Services Department				
A. Recreational Facilities Division				
(1) Golf Course	Pesticide Tank Rinse	50 Gal	56 - 81	GROUND
		50 Gal	81 - 84	PWHWP
	Waste Motor Oil	50 Gal	56 - 84	GROUND
(2) Boat/Camper Shop	Waste Motor Oil	50 Gal	67 - 81	LNDFL
		50 Gal	81 - 84	WFUEL
(3) Auto Hobby Shop	Waste Motor Oil	550 Gal	65 - 76	WFUEL
		1,110 Gal	76 - 84	CNTRCT
	PD 680	5 Gal	65 - 76	WFUEL
		5 Gal	77 - 84	CNTRCT
(4) Bowling Alley	PD 680	100 Gal	71 - 81	SS
		50 Gal	71 - 81	GROUND
		150 Gal	82 - 84	PWHWP
(5) Maintenance Shop	Waste Motor Oil	20 Gal	56 - 77	GROUND
		20 Gal	77 - 84	CNTRCT
	Waste Paint Cans	100 Gal	56 - 81	LNDFL
		100 Gal	82 - 84	PWHWP

Table 5-1

Waste Generation at NAS Oceana

(Page 4)

Activity	Waste	Generation Rate Per Year	Duration	Disposal Mode
3. Air Operations Department				
A. ALF Fentress	AFFF	300 Gal	69 - 84	GROUND
	Waste Motor Oil	250 Gal	47 - 84	WFUEL
B. Ground Electronic Maintenance Division	Trichloroethylene	5 Gal	55 - 81	SS
	Paint Removers	5 Gal	55 - 81	SS
C. Fire and Rescue Division	AFFF	400 Gal	69 - 84	GROUND
D. Airfield Support Division	Antifreeze	385 Gal	61 - 84	GROUND
4. Aircraft Intermediate Maintenance Department				
A. Power Plant Division	Waste Oil	260 Gal	74 - 84	WFUEL
B. Air Frames Division	Toluene, Methyl Isobutyl Ketone	50 Gal	70 - 81	SS
		50 Gal	82 - 84	PWHWP
	Paint	24 Gal	70 - 81	SS
		24 Gal	82 - 84	PWHWP
	Methyl Ethyl Ketone (MEK)	240 Gal	70 - 81	SS
		240 Gal	82 - 84	PWHWP
	Paint Stripping Solution	1,200 Gal	70 - 81	SS
		1,200 Gal	82 - 84	PWHWP
	Hydraulic Fluid	1,200 Gal	70 - 84	WFUEL
	Trichlorotrifluoroethane	12 Gal	70 - 84	WFUEL
	PD 680	1,800 Gal	70 - 84	WFUEL

Table 5-1

Waste Generation at NAS Oceana

(Page 5)

Activity	Waste	Generation Rate Per Year		Duration	Disposal Mode
	Turco Detergent	1,000	Gal	70 - 84	SS/GROUND
	Photo Developers	12	Gal	70 - 84	SS
	Photo Fixer	30	Gal	70 - 84	Reclaimed
	Penetrant/Emulsifier	40	Gal	70 - 81	SS
		40	Gal	82 - 84	PWHWP
C. Avionics Division	Cooling Oil	120	Gal	70 - 81	SS/GROUND
		240	Gal	82 - 84	PWHWP
	Hydraulic Fluid	15	Gal	70 - 81	SS/GROUND
		30	Gal	82 - 84	PWHWP
	Synthetic Turbine (Oil)	72	Gal	70 - 81	SS/GROUND
		144	Gal	82 - 84	PWHWP
	PD 680	60	Gal	70 - 81	SS/GROUND
		120	Gal	82 - 84	PWHWP
	Epoxy Paint Waste	6	Gal	70 - 81	LNDFL
		6	Gal	82 - 84	PWHWP
	Isopropyl Alcohol	36	Gal	70 - 84	SS
	Electroplating Wastes	0.5	Gal	70 - 81	LNDFL
		1	Gal	82 - 84	PWHWP
D. Armament Equipment Division	PD 680	120	Gal	70 - 84	WFUEL
	B&B Stripper	400	Gal	70 - 84	WFUEL

Table 5-1

Waste Generation at NAS Oceana

(Page 6)

Activity		Waste	Generation Rate Per Year		Duration	Disposal Mode
		Cooling Oil	90	Gal	70 - 84	WFUEL
		Weapons Lube Oil	120	Gal	70 - 84	WFUEL
		Methyl Ethyl Ketone	14	Gal	70 - 81	SS
E.	Support Equipment	Waste Petroleum, Lube Oils, Hydraulic Fluid, Antifreeze, Fuel	7,200	Gal	66 - 84	WFUEL
		Waste Paint	5	Gal	66 - 81	WFUEL
			5	Gal	82 - 84	PWHWP
		Paint and Paint	1,800	Gal	66 - 81	WFUEL
		Stripper Sludges	1,800	Gal	82 - 84	PWHWP
		PD 680	600	Gal	66 - 81	WFUEL
			600	Gal	82 - 84	PWHWP
		Water Curtain Spray Paint Waste Water	7,800	Gal	66 - 84	SS
5.	Weapons Department	Dichlorodifluoromethane	10	Gal	54 - 81	LNDFL
			10	Gal	82 - 84	PWHWP
		PD 680	5	Gal	54 - 81	LNDFL
			5	Gal	82 - 84	PWHWP
		Waste Lube Oils	30	Gal	54 - 81	LNDFL
			30	Gal	82 - 84	WFUEL
6.	Naval Construction Battalion	Waste Lube and	2,400	Gal	early 50s - 84	WFUEL
		Hydraulic Oils	600	Gal	early 50s - 84	SS
		Antifreeze	600	Gal	82 - 84	PWHWP

Table 5-1

Waste Generation at NAS Oceana

(Page 7)

	Activity	Waste	Generation Rate Per Year		Duration	Disposal Mode
7.	Navy Exchange					
	A. Maintenance Shop	Safety Klean Solvent	60	Gal	late 50s - 84	CNTRCT
		Waste Lube Oil	15	Gal	late 50s - 81	GROUND
		Waste Lube Oil	15	Gal	82 - 84	PWHWP
	B. Gas Station	Waste Oils	4,800	Gal	late 50s - 84	CNTRCT
		Safety Klean Solvent	60	Gal	late 50s - 84	CNTRCT
		Old Batteries	1,800	Units	late 50s - 84	CNTRCT
8.	Fighter Squadrons (The listed quantities should be multiplied by 12 to obtain totals for all squadrons)	PD 680	390	Gal	66 - 81	WFUEL
			780	Gal	82 - 84	PWHWP
		Paint Stripper	12	Gal	66 - 81	WFUEL
			24	Gal	82 - 84	PWHWP
		Naptha	270	Gal	66 - 81	WFUEL
			540	Gal	82 - 84	PWHWP
		B&D 3400 Engine Cleaner	90	Gal	66 - 81	WFUEL
			180	Gal	82 - 84	PWHWP
		UP-5 Fuel, Hydraulic Fluid, Cooling Oil 25R	500	Gal	66 - 84	WFUEL
9.	Naval Regional Dental Center	Scrap Amalgam, X-ray Film, Film Fixing Solutions	Unknown		79 - 84	NORF

Table 5-1

Waste Generation at NAS Oceana

(Page 8)

	Activity	Waste	Generation Rate Per Year		Duration	Disposal Mode
10.	Naval Regional Medical Center	Iodine, Alcohol, Acetone	20	Gal	54 - 84	SS
11.	Medium Attack Wing One					
	A. Corrosion Control	Paint, Thinners, Turco Stripping Chemicals	280	Gal	57- 76	GROUND
			280	Gal	77 - 81	WFUEL/GROUND
					82 - 84	PWHWP/GROUND
		Metal Etching Solution: Ferricyanide, Salts, Chromates, Fluorides in Acid	110	Gal	57 - 84	STMDRN
	B. Power Plant Shops	JP-5 Fuel (Pencil Drained)	4,200	Gal	57 - 84	WFUEL
		Waste Lube Oil	2,160	Gal	57 - 81	WFUEL/GROUND
		Waste Lube Oil	2,160	Gal	82 - 84	WFUEL
		PD 680	360	Gal	57 - 81	WFUEL/GROUND
		PD 680	360	Gal	82 - 84	WFUEL
	C. Airframe Shops	Hydraulic Fluids	156	Gal	57 - 84	WFUEL/GROUND
		PD 680	240	Gal	57 - 81	WFUEL/GROUND
		PD 680	240	Gal	82 - 84	PWHWP

Table 5-1

Waste Generation at NAS Oceana

(Page 9)

	Activity	Waste	Generation Rate Per Year	Duration	Disposal Mode
	D. Phase Division	PD 680	12 Gal	late 60s - 71	GROUND
			12 Gal	57 - 81	WFUEL
			12 Gal	82 - 84	PWHWP
		Waste Lube Oil	48 Gal	late 60s - 71	GROUND
			48 Gal	57 - 84	WFUEL
		Waste Hydraulic Fluid	144 Gal	57 - 71	GROUND
			144 Gal	57 - 84	WFUEL
	E. Line Division	Waste Oil	1,620 Gal	57 - 84	WFUEL/GROUND
		Waste JP-5	480 Gal	57 - 84	WFUEL/GROUND
	F. Miscellaneous Shops	PD 680	540 Gal	57 - 71	GROUND
		PD 680	540 Gal	72 - 81	WFUEL
		PD 680	540 Gal	82 - 84	PWHWP
12.	Naval Air Maintenance Training Detachment	Radar Cooling Oil	10 Gal	75 - 81 82-84	WFUEL PWHWP
13.	Fleet Aviation Specialized Operational Training Group Atlantic	Hydraulic Fluid	50 Gal	60 - 84	WFUEL
14.	Fleet Audio Visual Center	Black and White, Color Photo Processing Chemicals	1,000 Gal	60 - 84	SS
		Photofixed, Used Films, Waste Photo Paper	Various	60 - 84	NORF
15.	Security Department	Conc. Sulfuric Acid	0.3 Gal	75 - 84	SS

Table 5-1

Waste Generation at NAS Oceana

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Abbrevations used for Disposal Mode:

SS:	Sanitary Sewer
PWHWP:	Public Works Hazardous Waste Pickup
LNDFL:	Landfill
ALF:	Asbestos Landfill
NORF:	Metal Salvage Yard at Norfolk
STMDRN:	Storm Drain
CNTRCT:	Contractor Removes From Base
GROUND:	Wastes Disposed on Ground
WFUEL:	Waste POL Pickup (1982-84) or Pickup of Waste POL Plus Other Non-Aquous Hazardous Wastes (Pre-1982)

The metal shop makes fittings, sheet metal pieces, and trimming for base facilities. The shop generates no industrial wastes. Scrap metal is disposed in a designated dumpster and sent to Norfolk for salvaging.

The welding shop performs all welding activities for base facilities. No wastes are generated in the shop. Solders are used up, and empty acetylene tanks are stored in a shed outside Public Works for recharging.

5.2.1.2 Building Trades Branch. The Building Trades Branch performs painting, masonry and electrical maintenance and repair for all public works and public utilities. These shops have been located in Building 820 since 1957.

The mason shop's services primarily involve removing and repairing aircraft runways. The shop is also responsible for bricklaying and installing tile floors and masonry doors. It uses small amounts of muriatic acid and glues. The only wastes generated from its services involve concrete rubble that is removed from old aircraft runways. The rubble is deposited in the sanitary landfill.

The paint shop is responsible for painting all buildings on NAS Oceana. It generates both waste paint and solvents in their daily operations. Approximately 110 gallon/year of paint and 120 gallon/year of solvents have been collected in drums for removal as a hazardous waste since 1982. Prior to that, these wastes were placed in dumpsters for landfill disposal.

The electrical shop is responsible for servicing electrical systems in buildings and maintaining runway lighting. An epoxy adhesive or an epoxy/sand aggregate are used in maintaining the runway lighting system. The epoxy is used to bond the centerline lights, while the aggregate compound is used to hold cables on the runway. There are no appreciable wastes generated from the operation of this shop.

Five of the regulators used to operate the runway lighting system contain polychlorinated biphenyls (PCBs). These regulators are located in Building E108 and contain 50-60 gallons of PCBs each. There is no record of leakage problems associated with these PCB regulators.

5.2.1.3 General Services Branch. The General Services Branch performs grounds maintenance and pest control and provides labor for refuse disposal and for other shops on an as needed basis. It operates the Grounds Maintenance and Pest Control shops.

The Pest Control Shop is responsible for weed, insect, and rodent control at the base, exclusive of the golf course. The shop has been located in Building 821, its present location, since 1968. Prior to 1968, Building TS6 was used to store pesticides at the Evaluation of Base Construction (EVABASCON) area. Various pesticides are used, including 2,4-D, 2,4,5-T, heptachlor, aldrin, chlordane, and Warfarin. DDT was used prior to its ban. The only waste that is routinely generated is a dilute rinse from the cleaning of the two 150-gallon spray tanks between mixes. Since 1982 the rinse has been placed in a holding tank which is pumped into drums and collected by Public Works. Prior to that the rinse was dumped onto the ground near the pesticide storage building.

Occasionally, residual amounts of pesticides have been discarded. It is estimated that approximately 200 gallons per year of formulations of one of the above pesticides were discarded: from 1941 to 1981 in the base landfills, and from 1982 to the present by way of the Public Works hazardous waste pickup.

5.2.1.4 Heat, Ventilation, and Air Conditioning (HVAC) Branch. The HVAC Branch is not a large generator of wastes. Until 1981, 10-20 gallon/year of the refrigerant Freon-11 was discarded to the air by evaporation from open topped barrels; since then Freon has been disposed of through PWD.

Repairs on closed systems require that cooling water be dumped. This water contains 0.005% of sodium hydroxide and Borax. Where possible, this liquid is dumped into the sanitary sewer system. However, from 50,000 to 100,000 gallon/year are dumped to the ground outside 25-30 buildings. At this concentration, the chemicals do not threaten either human health or the environment.

5.2.2 Transportation Division. The Transportation Division of Public Works is responsible for maintenance and repair of the vehicles used by all tenants on the base, with the exception of special services, the post exchange, and the SEABEEs. Both branches of this division (the heavy and the light equipment repair branches) have been located in Building 830 since 1954.

The Transportation Division has used about 5 gallons each per month of paints and paint thinners. This usage has been fairly constant in volume. About 20% of this volume is discarded. Since 1982 it has been picked up by the Public Works hazardous waste detail. Before that it was placed in dumpsters destined for the base landfill. Used paint and thinner cans are placed in dumpsters for removal.

Two types of degreasing chemicals are used for parts cleaning in the vehicle shops. Since 1982 an outside contractor has maintained these baths. This contractor is responsible for replenishing baths and disposing of spent baths. Both degreasing baths are Varsol (kerosene) related, and about 5 to 10 gallons per month of spent degreaser is hauled away by the contractor.

Before 1982 Varsol was used for parts cleaning. Spent cleaning baths (about 5 to 10 gallons per month) were collected in five-gallon cans and then disposed of in the bowsers (mobile tanks) with the used crankcase oils.

Used oil from oil changes is collected in 500 gallon bowsers. From 1,500 to 2,000 gallons per year of these used oils are generated by vehicle maintenance. When 500 gallons is collected, it is transported to the Fuel Division Yard for transfer to storage tanks.

About 1,000 gallons per year of spent antifreeze (ethylene glycol) is disposed of down floor drains that lead to the sanitary sewer.

5.2.3 Utilities Division. The Utilities Division is responsible for the operation and maintenance of all primary electrical circuits, water distribution systems, sewage collection systems, generators, electrical and compressed air aircraft starting systems, and steam generation and distribution systems.

5.2.3.1 Air and Electrical Distribution Branch. The Air and Electrical Distribution Branch maintains and operates the compressed air jet engine start systems, large air compressors, 400 cycle and 28 volt DC electrical systems, emergency generators, and all electrical systems in the Utilities Division. It also is responsible for operation and maintenance of Oceana's water distribution and sewage collection systems.

The branch services all transformers on the base, including larger ones containing PCBs. In 1976, a base-wide inventory of transformers was carried out by Public Works. Several of the PCB-containing transformers were found to be slowly leaking. All transformers are inspected regularly and cleaned up as needed according to accepted practices. None has been removed from service due to leaking. Fluid lost from leaking transformers has not been replaced. At the time of the inventory, reportedly there were no large transformers stored on the base although several have been taken out of service since then and stored, awaiting removal, on the ground along the southwest fence in the transportation yard. In early 1984 there were four large transformers known to contain PCBs in the yard. Some of these have small leaks.

Small transformers presumed not to contain PCBs based on label information were stored directly behind Building 820 until 1977, when they were moved to an asphalt pad outside Building 403. Currently, there are about 25 usable transformers stored in this area. Exxon-Univolt is used to top off the small transformers. Three PCB-containing capacitors are stored in the small transformer storage yard outside Building 403.

The Utility Division shop uses about 12 gallon/year of diesel oil as a degreasing agent. It is turned in to PWD for disposal. The shop also uses about 20 gallon/year of an electric motor cleaner which evaporates as it is used. Shop chemicals are stored in 55-gallon barrels on an asphalt surface just outside the shop. The area is not bermed and drains to a storm sewer inlet.

Air compressors used for starting jet engines are operated and maintained by the division. They are located across the taxiing lane from Line Shack 125 and were installed in 1973. Until 1979, oil condensate from the compressed air was released to the ground just outside the compressor area. About 180 gallons/year of oil was disposed of in this manner. In 1979, a drain and oil separator was installed to catch the oil but since the oil is released under pressure, oil in the separator was blown out. In 1981, a flow restrictor was installed to correct the blow out problem; but then the oil/water separator was found to have been installed with its tanks reversed. Finally in 1983, the separator was reinstalled and is now functioning properly.

There are no hazardous chemical wastes produced from the water distribution system or the sewage collection system.

5.2.3.2 Steam Generation Branch. The Steam Generation Branch at Utilities uses oil as fuel to generate low pressure steam for heating throughout the base. This branch is located in Building 601, which was constructed in 1953. The current boilers have been in use since 1956.

Boiler treatment chemicals which have been used include trisodium phosphate (500 pounds per year), sodium sulfite (300 pounds per year), diethanolamine (DEA - 300 gallons per year), and Southeastern Labs 1101 (300 gallons per year). All of these chemicals are lost through blowdown. Boiler blowdown is directed to the sanitary sewer.

Number 6 oil is used for fuel. It is stored in a 400,000-gallon tank (listed as Building 602). Although a rail siding is available for oil deliveries, all fuel is received from the fuel farm by truck. About 5 to 10 gallons of oil are spilled several times per year. These spills have been cleaned up each time. In 1975 a major spill occurred through a leak in the storage tank. About 2,000 gallons of oil were spilled inside the dike. This spilled oil was cleaned up and no major spill has been reported since that date.

5.2.3.3 Operations Branch. Operations Branch operates the Class "C" vehicle dispatch pool on a chauffeur or self-driven basis. Maintenance of its vehicles is done by the Light

Equipment Repair Branch. The Operations Branch does not generate any hazardous wastes.

5.3 SUPPLY DEPARTMENT. The Naval Supply Department provides supply services and related support functions for naval activities and manages petroleum, oil, lubricant (POL) products for military services.

5.3.1 Fuel Division. The Fuel Division both stores and issues POLs that include jet fuels, motor vehicle gas, heating oils, and lubricants. In addition, the Fuel Division operates facilities and equipment for the delivery of aviation fuels and bulk lubricating oil alongside aircraft, and for transporting fuel drained from aircraft.

5.3.2 Materials Division. The Materials Division is responsible for ordering, transporting, and storing nearly all material used at the Oceana Naval Air Station. The division has been located in the present building (529) since 1954, when it moved from North Station. Prior to 1954, Materials Division was an adjunct to Norfolk and occupied several small buildings at North Station, which have since been razed.

The only wastes routinely generated by the Materials Division are over-aged sealants and paints. These materials are turned over to the Defense Property Disposal Office (DPDO), Norfolk, for disposition. This has been the standard procedure since the existence of the Materials Division. Any spills that occur are recovered and handled by Public Works.

Prior to the Public Works hazardous waste disposal program, it was common practice for most shops to turn in waste to the Materials Division for disposal. This material was manifested and trucked to Norfolk for disposal. Two to three drums of waste per week were handled in this manner.

5.4 SPECIAL SERVICES DEPARTMENT. The Special Services Department at NAS Oceana develops and conducts programs and services designed to maintain the morale of Navy personnel and their dependents. The department consists of an Administrative Division, a Recreational Facilities Division, and an Athletic Division. Recreational Facilities is the only division that generates industrial wastes.

5.4.1 Recreational Facilities Division. The Recreational Facilities Division provides diversified indoor and outdoor recreational facilities and activities for military personnel, their dependents and guests, and other authorized patrons. The division consists of eight recreation branches and a maintenance shop. Of these, four recreation branches (Golf Course Branch, Boat/Camper Shop Branch, Auto Hobby Shop Branch, Bowling Center Branch) and the maintenance shop generate industrial wastes.

5.4.1.1 Golf Course. The NAS Oceana golf course has been in existence since 1956. The golf course barn, Building 798, houses pesticides and maintenance equipment for the facility. The golf course maintenance department uses:

100-120 lb/yr of fungicides, including Daconil, Chipco 26019, and Dursban;

80-90 gal/yr of herbicide, including Daconte 6; and

5-10 gal/yr of insecticide (Oursban).

Pesticides have been drained from the tank into a 55-gallon barrel and removed by Public Works hazardous waste pickup (less than one barrel/year) since 1982. Residual (diluted) pesticides were rinsed from the spray tank over a concrete rinsing pad outside Building 798 before 1982. Waste oil from golf course machinery (about 50 gallon/year) is spread over nearby gravel for dust control. Golf course personnel know of no pesticide dumping incidents since 1962, and there are no records of pesticide dumping or illegal disposal by golf course personnel.

5.4.1.2 Boat Camper Shop. The Boat/Camper Shop (Building TS-2) does maintenance on small outboard motors. It produces about 50 gallon/year of waste oil which is turned into PWD. Prior to 1982, it was placed in a dumpster.

5.4.1.3 Auto Hobby Shop. The present auto hobby shop in Building 543 has been at Oceana since 1976. It was located in the Special Services maintenance building (Building 527) prior to 1976. About 5 gallon/year of PD 680 are used in a batch tank for tool cleaning. Waste PD 680 and waste motor oil and fluids (about 1,110 gallons/year) have been placed in the shop oil/water separator since 1977, which has been pumped out by a local waste oil reclaimer. Oils and solvents from the previous shop (about 550 gallons/year) went into the Public Works bowser for local dust control.

5.4.1.4 Bowling Alley. The bowling alley in Bldg 540 has used PD 680 as a cleaning solvent (about 100-150 gallons/year) since its opening in 1971. Spent solvent has been drained back into the original barrels and picked up by Public Works hazardous waste pickup since 1982. Previously, waste solvents went down a sanitary drain or occasionally were poured on the ground outside the bowling alley.

5.4.1.5 Maintenance Shop. The Special Services Maintenance Shop is located in Building 527. The shop performs preventive maintenance (bulb-changing, touch-up painting, etc.) duties for Special Service Department facilities. Waste oil from shop vehicles (about 20 gallons/year) has been placed in the auto hobby shop oil/water separator since 1977. It went onto nearby grounds for dust control previously. The maintenance shop uses less than 100 gallons of paint per year. Waste paints have gone into a hazardous waste-designated 55 gallon drum outside building 527 since 1982, and waste paint and empty cans were picked up by Public Works hazardous waste pickup. Waste paints and cans went into dumpsters before that.

5.5 AIR OPERATIONS DEPARTMENT. The Air Operations Department operates the airfield at Oceana and the auxiliary landing field facilities at Fentress. It also supports operations of station, tenant, and transient aircraft. Its responsibilities include air traffic control, operation of the air terminal, repair and maintenance of ground electronic equipment, and fire protection.

5.5.1 Auxiliary Landing Field - Fentress. Fentress Field is used exclusively for practice carrier landings and night landing maneuvers. The primary users are experienced pilots who must maintain their qualifications or to qualify in a new aircraft. The 8,000-foot runway has carrier landing arresting gear to simulate a carrier landing. Fire-fighting drills are conducted on Thursday of each week. There are currently 41 people assigned to the station. Potable water is supplied from two onsite deep water wells. Sewage has been treated since 1980 in two operation basins at the north end of the station near Blackwater Road. Treated efficient from the basins is sprayed onto an adjacent field.

The present operations center was completed in June 1980. Operations at the facility date back to the early 1950s. Prior to 1981 there was a rapid refueling station for aircraft at the base. This system consisted of a 50,000 gallon underground fuel tank and a small day tank, connected by approximately 3,500 feet of underground pipe. At some time during 1981 the inside coating of the storage tank failed. It was subsequently emptied and is currently undergoing repairs.

The only wastes presently generated at the facility are empty 5-gallon plastic containers (25 per month) which contained aqueous film forming foam (AFFF) and used oil from the hobby shop. AFFF has been used in fire fighting exercises since 1969. The used oil is from work done on personal vehicles by base personnel. This oil is stored in a bowser and subsequently burned in the fire ring, located on an abandoned taxiway, during fire-fighting exercises. The volume of oil is estimated to be 10 to 20 gallons per month. Fuel for the fire training ring is stored in old tank trucks onsite. Spilled fuel and oils cover an area of approximately 2,000 square feet.

There is a three-acre landfill at the north end of Runway 23 which was used between 1945 to 1970. After its closing some construction, vegetation debris and discarded appliances were dumped on the surface of the closed landfill. In 1983 the accumulated material was buried in a 50 x 20 x 6 foot trench adjacent to the old landfill. At the same time another ditch, 70 x 20 x 12 feet was opened nearby and is currently used to burn the empty AFFF containers, dead tree debris and an occasional arresting gear belt.

5.5.2 Ground Electronic Maintenance Division. The Ground Electronics Maintenance Division (GEMD) has been based in Building 102 at NAS Oceana since 1955. The division consists of a Communications Maintenance Branch, a Radar Branch, and a Meteorology/Security/Storing Maintenance Branch. GEMD maintains radar, tactical/nontactical communications equipment, security systems, air monitering systems and all radios used at NAS Oceana, Fentress, and the Navy's Garrett County, N.C. facility. Solvents have been used by GEMD before 1981 include trichloroethylene (5 gallon/year), isopropyl alcohol (about 1 gallon/year) and organic paint removers (less than 5 gallon/year). Past disposal practices included dumping waste chemicals down drains and dumping waste chemicals into the ocean via ship or helicopter. Empty containers usually went into nearby dumpsters.

Chemicals now used by GEMD include solvents (1,1,1 trichloroethane, 5 gallon/year; PD 680, 5 gallon/year; isopropyl alcohol, 1 gallon/year; "superagitine" parts cleaning fluid, 2 gallon/year) and corrosion prevention compounds (sprays, less than 10 16-ounce cans/year). Solvents are applied by hand and evaporate, and corrosion prevention compounds are not wasted. Empty containers are thrown in nearby dumpsters.

5.5.3 Aircraft Structural Fire and Rescue Division. This division performs crash, fire, and rescue operations, both on and off station. It conducts training programs for these operation, fire inspection, and safety programs.

The Fire Prevention Branch has used a part of abandoned Runway 18-36 on the west side of the base for firefighting training exercises since the early 1960s. Two practice fires each weekend with favorable weather are lit using waste fuel and oil. Until the mid-1970s, 50 to 75 gallons of waste fuel was poured in the center of the runway, lit, then extinguished. Although a small fraction of the fuel remained unburned on the pad after the exercise, it was not usually enough to drain or be washed off the flat surface of the runway. In the mid-1970s, a fire pit was built consisting of an earthen berm, about 75 feet in diameter, resting directly on the runway. Due to the better containment provided by the fire pit, about 300 to 500 gallons of waste fuel per exercise is placed in the pit for burning. If the pit fills with water from the exercise or rainfall, it is pumped out from the pit bottom to prevent oil floating on its surface from escaping the confines of the berm.

The mixture of waste fuel, oil and hydraulic fluid that is used in the fire fighting exercises is obtained from the Fuel Division of the Supply Department. The waste is accumulated in a tank truck and periodically transferred to a 15,000-gallon horizontal bermed tank that rests west of the fire pit.

Since 1969 the Fire Prevention Branch has used about 2,000 gallons or less of Aqueous Film Forming Fluid (AFFF) per year, mainly in its training exercises at the fire pit. Reportedly, most of the AFFF (estimated to be 80% or more) and the fuel is burned and/or swept into the air by updrafts created by the fire.

5.5.4 Airfield Support Division. This division operates and maintains the aircraft arresting gear and performs aircraft salvage operations. It coordinates runway and airfield lighting maintenance and Public Works.

The only wastes generated by the division are the used arresting gear straps, which are presently stored on concrete pads at North Field and on sections of the old runway; and antifreeze (ethylene glycol) used in the arresting gears since the early 1960s, which is dumped onto the grass beside the runway. About 385 gallons/year of antifreeze have been disposed of in this way.

5.5.5 Transient Line. It is the responsibility of the Transient Line Branch (Building 102) to perform routine maintenance on transient aircraft of all types. This service is limited to adding fuel, lubricating oil, hydraulic oil, nitrogen, and oxygen. The only waste generated is from leaks and spills which are collected with swabs or "Speedy-Dry" and disposed of in a dumpster.

5.6 AIRCRAFT INTERMEDIATE MAINTENANCE DEPARTMENT. The Aircraft Intermediate Maintenance Department (AIMD) directs the overall intermediate maintenance effort in support of station aircraft and tenant squadrons and units. The Department is responsible for the disassembly, cleaning, inspection, repair, assembly, and testing of aircraft and their components. The Maintenance/Material Control Division of AIMD schedules, coordinates, and monitors the work of the Department's various divisions. The divisions generating hazardous wastes are discussed in the sections that follow. These divisions are located in various buildings along Avenue B.

5.6.1 Power Plant Division. The Power Plants Division of AIMD is responsible for maintenance and testing of jet engines and removable aircraft fuel tanks.

5.6.1.1 Jet Engine Maintenance. The actual jet engine maintenance is performed in Building 301, which was built in 1960. Since 1960, an average of 40 jet engines have left the shop each month. Recent (1983-84) average production is 100 engines per month.

Only a few chemicals are used in the maintenance shop, including methyl ethyl ketone (MEK) (about five gallons per month) and oils. Cans from these chemicals are placed into the dumpster. The MEK evaporates during cleaning and is not disposed of. Oil spills are cleaned up with Speedy-Dry, which goes to the dumpster to be picked up by Public Works.

From 1960 until about 1971, high-pressure air was used to turn the engines over in order to inject 1010 oil for engine preservation. Most spilled oil was caught in drip pans and placed in waste oil containers for pickup. Some was lost in an air mist over an area where the present tank maintenance building (Building 306) is located.

5.6.1.2 Aircraft Fuel Tank Maintenance Shop. The Tank Maintenance Shop is responsible for maintenance of detachable aircraft fuel tanks ("drop tanks"). This is a new shop which was constructed during 1974 as Building 306.

Small quantities of chemicals are used in this shop. These are: hydraulic fluid (4 to 6 gallons per week), 1010 oil (10 to 15 gallons per week), PD 680 (1 gallon per week), Freon (1/2 gallon per week), and corrosion preventative (1 gallon per week). In addition, spray paints, moly lube, and penetrating oil are used in small quantities. With the exception of hydraulic fluid and 1010 oil, all of the chemicals are used up and only empty containers are disposed of in the dumpster for pickup and landfill disposal by Public Works. Small quantities of waste hydraulic oil and 1010 oil (about 4 gallons each per week) are disposed of in 55-gallon drums, which are picked up by Public Works.

All of these chemicals have been used since the shop was constructed in 1974. A long-term average usage of these chemicals would be about 2/3 of current consumption.

5.6.1.3 Jet Engine Test Cells. There are three jet test cells at the Oceana base. One cell (Building 305) was constructed in 1965 and was in use from 1965 to about 1973. This test cell is adjacent to Building 306. Two other test cells (Buildings 1100 and 1102) were constructed in 1971 and 1972, respectively. These test cells are at a distance from the repair facility near the south end of the runway and are currently in use.

All jet engines which pass through the power plant shop (currently about 100 per month) are tested in the test cells. The engine tests use JP-5 fuel. At the conclusion of the test, the fuel is switched to 1010 oil and the engine is shut down with 1010 oil in the fuel lines as a preservative. About 3,000 gallons of JP-5 and 200 gallons of 1010 oil are consumed each day in testing. It is estimated that this consumption would be about 2-1/2 times the long-term average consumption.

There are three underground JP-5 fuel tanks at the new test cells. Two of these tanks have developed leaks and the resulting JP-5 spills have been investigated (Wright Associates, 1983). A fuel truck is being used as an aboveground tank.

Mercury has been used in test cell control rooms in pressure measurement devices (manometers). During 1974 to 1975, the presence of spilled mercury in the newer test cells (Building 1100 and 1102) was detected in the control rooms and on the ground outside the control rooms. Contaminated soils from the cleanup of this area were removed by Public Works and tested prior to disposal at the landfill. Building material from the cleanup (floor tiles, ceiling tiles, and the manometers themselves) was removed to the Bougainville Area for temporary storage. These construction materials contained an estimated 10 to 50 pounds of metallic mercury. The resulting spill of mercury in the Bougainville area is described in Chapter 8. Mercury manometers have been replaced with pressure instruments that do not require mercury.

Metallic mercury was discovered in cracks in the floor of the control room of the abandoned test cell (Building 305). A very rough estimate of the amount of visible mercury in the control room would be one pound. In addition, the slope of land outside the control room would indicate the possibility of soil contamination with spilled mercury similar to that seen in the newer test cells. Because there are no ceiling tiles in this control room, the total mercury collecting in the room would probably not be as great as that found in the newer test cell control rooms.

5.6.2 Airframes Division. These shops perform component repair and intermediate maintenance on airframe systems, hydraulic components, and associated equipment and selected intermediate functions. In addition, the division provides on-the-job training for fleet personnel. There are eight individual shops in this division. All shops are located in Building 513 (constructed in 1970) except the Nondestructive Inspection (NDI) Shop. This shop has been assigned temporary space in Building 301.

5.6.2.1 Corrosion Control Shop. The corrosion control shop is responsible for stripping old paint and painting aircraft and components. Chemical wastes generated from maintenance operations include toluene methyl isobutyl ketone (TMIK), paints (epoxys, polyamide primer enamels, lacquers, and polyurethanes), and MEK. Monthly waste generation rates are approximately 4 gallons of TMIK, 2 gallons of paints and 20 gallons of MEK. The Corrosion Control Shop also maintains one of the 300-gallon vats in the stripping room. The stripping solution in the vat is replaced every three months. The solution is pumped into 55-gallon drums and has been picked up by Public Works Department for the past year. Prior to this time, the waste solution was poured into the floor grate which is connected to the sewage treatment plant. There are three additional 300-gallon vats in the stripping room. One of the vats also contains stripping solution and is maintained by the Armament Equipment Division. The other two vats are for emergency reclamation and contain water and Turco detergent.

5.6.2.2 Hydraulic Shop—Component Repair. The hydraulic shop (component repair) is responsible for repairing all hydraulic systems with the exception of brakes. Wastes generated in this shop include hydraulic fluid (50-100 gallon/month), trichlorotrifluoroethane (5 gallon/month) and PD-680 cleaning solvent (15 gallon/month). It is estimated that 90% or more of the trichlorofluoroethane evaporates during use; residuals of this and the other two fluids have been disposed in waste oil bowsers since 1970.

5.6.2.3 Hydraulic Shop—Brake Repair. The hydraulic shop (brake repair) is responsible for all brake repairs. The only significant waste generated by the brake shop is PD-680 cleaning solvent (10-15 gallon/month) which is placed in waste oil bowsers for disposal. About 5 gallon/month of trichlorotrifluoroethane is also used for rinsing parts. Most of this solution, however, evaporates during usage. Some aircraft currently operate with the older beryllium brakes. If a beryllium brake is damaged or shattered, the damaged parts are bagged and sent to the Naval Air Rework Facility in Norfolk for either repair or disposal.

5.6.2.4 Welding Shop. The welding shop is responsible for all welding repairs on aircraft and components. Although small amounts of lubricating oil are used in cutting metals, no wastes are generated for disposal.

5.6.2.5 Structure Shop. The structure shop is responsible for sheet metal and riveting, and the application of sealant compounds and chemical resins on aircraft and components. Although this shop uses less than ten gallons per year of lubricating oil and MEK, they are either consumed in use or evaporate.

5.6.2.6 Tire Shop. The tire shop is responsible for rebuilding and servicing aircraft tires. Approximately 120 gallon/month of PD-680 and PC-680 cleaning solvents are generated as a waste from cleaning bearings. In addition, about 80 gallon/month of Turco detergent is used to clean tires; this drains either to the ground or to the sanitary sewer line.

5.6.2.7 Machine Shop. The machine shop is responsible for machine repair of components requiring milling or planing. Lube and cutting oils are used on machinery but there is no waste generated.

5.6.2.8 Nondestructive Inspection (NDI) Shop. The NDI shop utilizes x-ray inspection to identify structural flaws or the presence of unwanted objects in the aircraft frame. The shop operates three radiacmeters and a single x-ray machine. Each radiacmeter is equipped with an attached radioactive pad to test equipment. There is no record of losing any of the test pads.

This lab also generates wastes in developing film. Approximately one gallon/month of the developer and developer stopper (acetic acid) are disposed of in the sanitary sewer. About 2½ gallon/month of the fixer is collected and sent to the base photo lab for silver recovery. The lab also maintains a magnetic particle inspection unit that contains kerosene. The kerosene, however, evaporates and no waste is generated.

A set of three 60-gallon tanks is used to treat non-magnetic materials with fluorescent dye. The first tank contains a penetrant, the second an emulsifier, and the third rinse water. Public Works collects the penetrant and emulsifier, which are changed every two to three years, or about 30 gallons/year of each. The rinse water is disposed of in the storm drain.

5.6.3 Avionics Division. The Avionics Division of AIMD is responsible for the maintenance of all electronic equipment on the jet aircraft. This division has been located in Building 513 since 1970.

A number of chemicals are used in this shop. The major chemicals used are cooling oil 25 (40 gallons per month), Freon (22 gallons per month), hydraulic fluid (5 gallons per month), isopropyl alcohol (6 gallon per month), synthetic turbine oil (24 gallons per month), PD 680 (20 gallons per month), ethyl alcohol (2 gallons per month), 1,1,1-trichlorofluoroethane (2 gallons per month), and epoxy paint (1 gallon per month). The cooling oil, hydraulic fluid, turbine oil, and PD 680 are collected in 5-gallon drums and picked up by Quality Assurance. The Quality Assurance group then transfers these to 55-gallon drums which are picked up by Public Works. Waste isopropyl alcohol (approximately 1 quart per week) is diluted and dumped to the sanitary drain. Waste epoxy paint is placed in the dumpster for disposal. All of the other chemicals from this group are consumed or evaporated in use. Only emply containers are disposed to the dumpster from these chemicals.

Chemicals used in spray can quantities include: aircraft cleaner compound, 1,1,1-trichloroethane, hemiseal, and Turco. These chemicals are completely used and the empty cans are disposed of to the dumpster.

Electroplating chemicals containing gold, nickel, copper, tin, lead, silver, rhodium, and cyanide are used in one of the shops of Avionics. Approximately 1 pint each of these chemicals are disposed of each year. The spent electroplating chemicals are collected in 5-gallon cans and sent to Quality Assurance for pickup and disposal by Public Works.

The present production of Avionics is very high. A long-term average consumption of chemicals would be approximately 1/2 of the current consumption levels listed above.

5.6.4 Armament Equipment Division. The Armament Equipment Division of AIMD is responsible for maintenance of the weapons support racks which are attached to aircraft. This division is located in Building 513.

A number of chemicals are used for the maintenance of the weapons racks. The chemicals used are PD 680 (20 gallons per month), paint thinner (10 gallons per month), epoxy paint (8 gallons per month), epoxy primer (6 gallons per month), B&B stripper (660 gallons per month), cooling oil 25 (15 gallons per month), and weapons lube oil (20 gallons per month). In addition, spray can quantities of Freon cleaner, lacquer, and paint stripper are used. These quantities of use represent approximately 2 times the long-term average. Essentially all of the PD 680, B&B stripper, cooling oil, and weapons lube oil are disposed of each month. These wastes are placed in oily waste drums outside the Armaments Division for pickup by Public Works.

All used paint cans and other liquids are washed out and placed in the dumpster for pickup by Public Works.

In past years, approximately 3 gallons per month of MEK was used, but use of this solvent was discontinued. Most of the MEK evaporated, with small residual portions (less than 10%) diluted and washed down the sanitary drain.

5.6.5 Aviator's Equipment Division. The Aviator's Equipment Division is responsible for oxygen equipment and flight suits used by aircraft crews. Present consumption of chemicals are as follows: oxygen-resistant oil (2 quarts per week), toluene (1 quart per week), and cans of spray paint (approximately 2 per week). All chemicals are consumed in use.

5.6.6 Support Equipment Division. The Support Equipment Division in Building 401 performs all maintenance on aircraft support equipment such as tow tractors, power units, etc. The division has been operating at the present location since 1966. Waste petroleum, lubricating oils, hydraulic oil, antifreeze, and fuel are dumped into the 200-gallon waste fuel bowser. This bowser is pumped out by Public Works at approximately 10-day intervals. Waste paint (5 gallons per month), paint and paint stripper sludge (150 gallons per month), and PD 680 (50 gallons per month) are put into the designated containers for disposal by Public Works. Prior to the hazardous waste disposal system now in effect, these liquids were placed into the bowser with the oils. Incidental spills are cleaned with rags, disposed into the dumpster, and the remainder is washed down the floor drain.

Waste acid generated by the battery shop is first diluted and neutralized, then drained into a special holding tank for this purpose. The neutralized solution is placed in the sanitary sewer.

A water-curtain paint spray booth generates approximately 650 gallons of wastewater each month. An additive is used to suspend the paint and is drained into a holding tank. The paint is removed as sludge and the waste water is released to the sanitary sewer.

Two to three drums of paint removing compound (mil. spec. R-81294B) are used each week in the paint stripping booth. This compound is rinsed off equipment with high-pressure water which drains into the same holding tank as the paint spray booth.

5.7 WEAPONS DEPARTMENT. The Weapons Department is responsible for supply and storage of all ordnance employed at the Oceana NAS. There are 15 magazines in the Weapons Department complex and 20 near the fuel farm (for small arms rounds).

There are very few chemicals used by the Weapons Department. VVL 800 (dichloro-difluoromethane - 10 gallons per year) and PD 680 (5 gallons per year) are used for cleaning. Approximately 30 gallons per year of waste oils are generated from weapons and vehicle lubrication. Waste chemicals are collected in 55-gallon drums for pickup by Public Works.

Ordnance is shipped by truck and stored in the magazines. Past shipments have been made by rail, and the facility for receiving shipments by rail is still available.

When ordnance is required, it is shipped by truck from the magazine. All ordnance is placed on aircraft at the ordnance pad. Inert and practice ordnance may be stored at the flight line. Most items are issued to the flights for storage on the aircraft or at the ordnance pad for up to 24 hours only. Seat ejection charges are placed in the aircraft and remain until used or declared out of date.

Out-of-date or defective ordnance is sent directly to Yorktown or is picked up by EOD Division 2. Ordnance which is picked up by the Explosives Ordnance Detachment (EOD) is stored in Magazine 12 at Naval Amphibious Base (NAB) Little Creek before shipment to Naval Weapons Station Yorktown for disposal. No disposal of ordnance is made at the Oceana NAS.

5.8 NAVAL CONSTRUCTION BATTALION. A Naval Construction Battalion has been in Building 840 since 1972. Construction Battalion Unit 415 is presently assigned to NAS Oceana. The unit consists of 41 people and 39 pieces of construction equipment. It is responsible for construction at NAS Oceana, NALF Fentress, Fleet Combat Training Center Dam Neck, and NAB Little Creek. Equipment is maintained at the garage in Building 840. Waste is limited to hydraulic oil, lubricating oil, antifreeze, and used paint cans.

Used oils are placed in a bowser and hauled to the fuel farm for disposal when full. Antifreeze has been placed in 5-gallon cans for pickup by Public Works since 1982. Before 1982 it was dumped into the sanitary sewer. Paint cans are disposed of in a dumpster. The waste oil generated is estimated to be between 100 and 200 gallons/month. Waste antifreeze is generated at a rate of approximately 600 gallons/year.

5.9 NAVY EXCHANGE. Navy Exchange facilities at NAS Oceana consist of a "mini-mart" store, a dry cleaning pickup (private contractor: no dry cleaning is or was done on the base), a maintenance shop (Building 518) and a service station (Building 541). No wastes are generated from the store or the dry cleaning pickup.

Navy exchange maintenance has been based in Building 518 since the late 1950's. Maintenance performs minor repairs (e.g., wire splicing, bulb changing, etc.), air conditioning/refrigeration recharging and repair, and minor painting and carpentry for Oceana and Fleet Combat Training Center Dam Neck exchange facilities. Freon has been used to recharge air conditioners and refrigeration equipment, and spent Freon evaporates. Latex paints (about 5 gallon/year) and paint thinners (about 2 gallon/year) have been used, and empty containers have been thrown in nearby dumpsters. About 5 gallon/year of formica cleaner (Bonsol 5/G) have been used for carpentry. The formica cleaner evaporates leaving no waste. Empty cleaner cans have also gone to nearby dumpsters. "Safety Kleen" solvent has been used for parts cleaning in a 15-gallon batch tank which has been drained and refilled by the Safety Kleen Company about four times a year. Oil changes from maintenance vehicles (less than 15 gallon/year) have gone to Public Works since 1982. Oils from vehicle maintenance were dumped along a 25-foot stretch of fence outside Building 518 through the 1970s.

The Navy Exchange Gas Station has been located in Building 541 since 1972. The previous service station was where the present credit union is. The station provides gas, oil/transmission/brake fluid changes, minor work and battery changes and electrolyte recharging to civilian vehicles. Spent oil and fluids from vehicles (300-400 gallon/month) have gone to an underground oil dump tank outside building 518 since 1972. The tank has been pumped out by a private contractor. The previous service station, in operation from the late 1950s to 1971, also had an oil dump tank that was used similarly to the present tank in Building 518. Solvents used in the past were placed in the oil dump tank. The gas station has also used a Safety Kleen solvent batch tank at the station, similar to Naval Exchange Maintenance. This tank is drained and refilled by the Safety Kleen Company.

Batteries removed from cars have been stored outside Building 518 on pallets (about 100-150/month). A private contractor has removed the old batteries when they deliver new batteries. Some refilling of batteries (up to 25 gallon/year) is performed, with no electrolyte wasted. Empty electrolyte cartons have been thrown away in a nearby dumpster.

The only known accident at either station occurred at the present station in the early 1980s when a car knocked a gas pump off line, and about 50 gallons of gasoline spilled from the pump head. The Oceana fire department washed down the spill.

5.10 FIGHTER SQUADRONS. The Fighter Squadrons at Oceana consist of a training squadron (VF 101) which is stationed at Oceana and a series of temporarily based squadrons which are rotated to the carriers for duty. There are 12 such squadrons, of which up to 8 may be stationed at Oceana at one time. All squadrons use about the same quantity of chemicals and POLs.

Chemicals used by each Fighter Squadron in moderate quantities are JP-5 jet fuel (thousands of gallons per month consumed), PD 680 (65 gallons per month), paint stripper (2 gallons per month), naptha (45 gallons per month), MEK (42 gallons per month), B&D 3400 engine cleaner (10 to 15 gallons per month), acrylic thinners (8 gallons per month), aladine (4 gallons per month), alcohol (3 gallons per month), epoxy primer coating (10 gallons per month), Freon (4 gallons per month), Turco (60 gallons per month), hydraulic fluid (10 gallons per month), and cooling oil 25R (30 gallons per month). Residuals for PD 680, paint stripper, naptha, and B&D 3400 are drummed for pickup by Public Works. Hydraulic fluid, cooling oil, and JP-5 defueling from jets are collected in bowsers and taken to the Supply Department Yard when full. The total of these waste POLs is approximately 1,000 gallons per month per squadron (mostly JP-5). All other chemicals are consumed or evaporate during use. Prior to September 1981, all wastes went to the waste oil bowsers.

Several chemicals used in spray can quantities include Freon, VVL 800, and paints. All empty cans are disposed of in the dumpster.

These quantities of chemicals represent current usage. Past usage of these same chemicals would have been less; current quantities represent approximately 2 times the long-term average.

One chemical not currently used but formerly used is in lacquer and lacquer thinner. These paints have been replaced with epoxy and acrylic materials.

The seat ejection charges are called for as needed and installed within 24 hours. No spares are kept. Out-of-date charges are returned to the Weapons Department and exchanged for new charges.

5.11 NAVAL REGIONAL DENTAL CENTER. The Dental Center (Building 285) is staffed by 10 dentists and has been located at the present site since the building was built in 1979. Prior to this, the center was located in the old Administration Building. No waste materials are generated by the center. Scrap amalgam, x-ray film, and x-ray fixing solutions are sent to Norfolk for mercury and silver recovery.

5.12 NAVAL REGIONAL MEDICAL CENTER. The Medical Center functions as an outpatient clinic only. An x-ray Department is used for routine x-rays only. The laboratory does simple procedures which generate small amounts of iodine, alcohol, and acetone waste amount to less than 20 gallons/year. These are washed down the sink to the sanitary sewer. All biological laboratory waste is sealed in special containers and sent to Portsmouth for disposal. No other wastes are generated by the center.

5.13 MEDIUM ATTACK WING ONE. Medium Attack Wing One is responsible for asset management and control of assigned fleet squadrons and units and provision of material readiness and type training associated with the A-6 weapons system.

One permanent squadron and seven fleet squadrons are based at NAS Oceana. There is actual space for only four fleet squadrons and one permanent squadron. At least four fleet squadrons are always stationed at NAS Oceana. Generally, a fleet squadron can be expected to be stationed at NAS Oceana 50% of the time. A fleet squadron is assigned hanger and shop space available at the time of arrival. Each fleet squadron contains 11 A-6 aircraft. The permanent squadron (VA-42) also operates 3 propeller aircraft (TC4C) that are used for training exercises. All hanger and shop space is provided in Building 122. This building was contructed and acquired by MATWING ONE in 1957.

Each squadron maintains and operates its own shop facilities. Generally, the shops are organized under three divisions: aircraft, avionics, and line. The Aircraft Division typically operates a Corrosion Control Shop, Airframes Shop, Power Plant Shop, Aviators Survival Equipment Shop, and Parachute-Riggers Shop. The permanent squadron (VA-42) also operates a Phase Shop and TC4C Shop within this division. The Avionics Division usually operates an Aviation Technician Shop, Aviation Electrician Shop, Aviation Fire Control Shop, Aviation Ordnance Shop, and Quality Assurance Shop. The Line Division is a single operation without individual shop designations. It is basically responsible for refueling services.

Both permanent squadrons and fleet squadrons can be expected to generate similar quantities of wastes. The percent of time fleet squadrons are actually based at NAS Oceana, however, will determine the waste generation quantities. The permanent squadron (VA-42) operates and maintains three TC4C training aircraft. Maintenance of these aircraft is expected to generate additional waste quantities.

Waste oils, fuel, and other hazardous wastes have been collected in bowsers at MATWING ONE for turn-in at the Fuel Division Yard since 1977. A centralized collection of hazardous wastes and the separation of POL from other waste chemicals, however, has only existed for two years. Since 1982, POLs have been taken to the Fuel Division yard and other hazardous chemicals are placed in marked barrels for pickup by the Public Works hazardous waste detail.

A common practice, particularly in the past, was disposal of liquid wastes in low areas behind Line Shacks 125 and 131. It is apparent that disposal in these areas has continued to some extent even after the implementation of centralized collection systems.

The following description includes shops in MATWING ONE that are known to generate hazardous wastes. Quantities provided represent amounts of waste that can be expected from all eight squadrons. The amount of time fleet squadrons are deployed or on work-up has been taken into consideration in developing these quantities.

5.13.1 Corrosion Control Shops. The corrosion control shops are responsible for stripping old paint off aircraft and spot painting. Hazardous wastes generated by this shop total about 23 gallon/month and include paint, thinners, and Turco stripping chemicals. The stripped surface of the aircraft is also treated with an acid that contains ferricyanide salts, acidic chromates, and fluorides. Approximately nine gallons of this acid, diluted with rinse water, is washed down storm drains each month.

5.13.2 Power Plant Shops. The power plant shops are responsible for all engine repairs. These shops also perform all defueling operations for fleet squadrons. Most defueling of aircraft in the permanent squadron (VA-42) is handled by the phase shop. The power plant shop for VA-42 only defuels those aircraft that are being serviced. The fleet squadrons defuel about 35,000 pounds of fuel each month. Most of this fuel is pumped directly into a defueling truck. About 350 pounds/month, however, must be pencil-drained into a drum or bowser. Wastes generated by the operation of this shop include oils (180 gallon/month) and PD 680 cleaning solvent (30 gallon/month) which is discarded in waste oil bowsers.

5.13.3 Airframe Shops. The airframe shops are responsible for servicing hydraulic systems and metal frame repairs. Wastes generated by the operation of this shop include hydraulic fluids (13 gallon/month), which are placed in the POL bowsers, and PD 680 cleaning solvent (20 gallon/month), which is picked up by Public Works as a hazardous waste. Previous to 1982, PD 680 was placed in POL bowsers.

5.13.4 Phase Division. The Phase Division is responsible for defueling aircraft for the permanent squadron (VA-42). About one gallon/month of PD 680 cleaning solvent is used in their operation. They also generate waste oils (4 gallon/month) and waste hydraulic fluids (12 gallon/month). Since 1982 PD 680 has been picked up by the Public Works hazardous waste detail. Prior to that it was discarded with waste oils.

5.13.5 Line Division. The Line Division is responsible for refueling aircraft. It generates about 135 gallon/month of waste oil and 40 gallon/month of waste JP-5 from left over fuel samples.

5.13.6 Miscellaneous Shops. The following shops produce very few waste products. They do, however, use PD 680 cleaning solvent. Quantities of waste solvent generated by their operations include the following:

Aviators Survival Equipment Shop (10 gal/mo),
Aviation Electrician Shop (5 gal/mo),
Aviation Technician Shop (5 gal/mo),
Aviation Fire Control Shop (5 gal/mo), and
Aviation Ordnance Shop (20 gal/mo).

5.14 NAVAL AIR MAINTENANCE TRAINING DETACHMENT. The Naval Air Maintenance Training Detachment is responsible for the training of aircraft maintenance crews on all naval jet aircraft. The detachment is comprised of approximately 280 people and has operated from its present location in Building 340 since 1975.

The only wastes produced are radar cooling oil and spilled or leaked hydraulic oil. Since 1982 cooling oil has been drained into five-gallon containers and about 10 gallons per year taken to the hazardous waste pickup point. Prior to 1982, the oil was discarded in waste fuel bowsers. Oil spills or leaks are soaked up with rags and the rags are disposed in the dumpster.

5.15 FLEET AVIATION SPECIALIZED OPERATIONAL TRAINING GROUP ATLANTIC. The training center is responsible for training and requalifying pilots using flight simulators. The center operates 24 hours per day, 5 days per week, and presently has 92 persons assigned to it. This facility will be contracted to a civilian concern in 1985. Operations have been in Buildings 240 and 340 since 1960. Previous flight training was done in trailers located in the same area as the present buildings.

The only waste materials produced are hydraulic oil from leaks and unit breakdowns, and filters from the hydraulic systems. It is estimated that approximately 50 gallons/year of hydraulic fluid is disposed of through Public Works. Hydraulic system filters are changed quarterly. The 25 filters from four simulators are placed in plastic bags and disposed of in the dumpster.

5.16 FLEET AUDIO VISUAL CENTER. This center is a detachment from the Fleet Audio Visual Center Atlantic, Norfolk. The audio visual center is responsible for the preparation of audio visual aids for education, security, and public relations. The center has been in Building 321 since its inception in 1959.

Both black-and-white and color processing are done on-site. All processes are automatic, including flushing of spent chemicals with dilution water. Photographic chemicals, estimated to be about 1,000 gallons per year, are flushed into the sanitary sewer with copious amounts of water. Used films, waste photographic paper, and fixers are sent to the Defense Property Disposal Office for silver recovery.

5.17 SECURITY DEPARTMENT. The Security Department is responsible for base security and acts as the police force for problems on the base. It has been housed in Building 280 since 1956.

Since about 1975, about 300 drunk tests have been given per year. These tests produce 4 milliliters per test of a strong sulfuric acid/dye solution. After dilution, the used test chemicals are flushed down the sanitary sewer.

During 1980 the Security Department stopped the practice of the using MACE as a riot control chemical. About 12 MACE containers were picked up by Public Works for disposal.

6. MATERIAL HANDLING: STORAGE AND TRANSPORTATION

6.1 INDUSTRIAL MATERIAL AND WASTE STORAGE. The storage and transportation of industrial materials on NAS Oceana is discussed in this section.

6.1.1 Materials Storage: Defense Property Disposal Office. The Defense Property Disposal Office (DPDO) does not maintain any facilities on the Naval Air Station (NAS) Oceana. Instead, materials designated for DPDO disposal are transferred into their custody on a "as is, where is" basis. However, even though the DPDO may assume custody of a particular item or consignment, the base maintains the benefit or hazard of regular inspection and clean-up, if it becomes necessary. The local DPDO office is located at Camp Allen.

One example of the DPDO hazardous waste disposal program is cited here: disposal of polychlorinated biphenyl (PCB) transformers. PCB transformers that are taken out of service are stored at the large transformer storage area described in detail in Chapter 8 of this document. There, the transformers are stored in the open, on a gravel pad. A visual inspection of the site revealed that none of the visible surfaces had been leaking. None of the inspected transformers had been taken out of service because of leaks. Since there is no maintenance provision at this storage location, the command wishes to dispose of them as soon as possible after their designation as "surplus" to the Navy's needs. Paperwork is forwarded to the DPDO requesting DPDO to take paper custody of the surplus transformers. The process is reported to be very slow, with the transformers in paper limbo for the duration. The orphan transformers may receive little or no direct attention from their new custodian during the time of their storage awaiting removal. The most recent removal of PCB transformers by DPDO occurred in April 1983, when four transformers were taken to Camp Allen. Since then, four more out of service transformers containing PCBs have been placed in the storage area and scheduled for pickup in mid-1984.

6.1.2 Chemicals and Hazardous Materials Storage. Most of the units visited at NAS Oceana observed proper storage of flammables, and hazardous materials. Flammable materials are stored in Buildings 105, 500-A to -E, and TS-10. Buildings 135, 42, and 513-D are designated for paint storage. Compressed gases (oxygen, acetylene, and argon) are stored in Buildings 513-B, 513-C, and 609. Prominently labeled smaller areas or lockers within larger buildings are available wherever hazardous materials are stored or used. Past practice included special precautions observed for the obviously flammable materials and little or no regard for proper storage or handling of either hazardous materials or the wastes generated through their use. Unless the materials had a known acute toxic effect, handling precautions were casual. An education program is run intermittently by the Public Works Department (PWD) to acquaint staff of proper handling, storage, and disposal of the materials.

6.1.3 Petroleum, Oil, and Lubricants. The Fuel Division of the Supply Department stores and issues most petroleum, oil, and lubricants (POLs) on NAS Oceana. NAS Oceana has a total bulk oil storage capacity of 4,020,500 gallons. This total does not include individual tanks located at the Housing Apartments and certain buildings utilizing No. 6 fuel oil for heating purposes. The fuel oil storage capacity is principally intended for JP-5, No. 2 heating fuel, No. 6 heating fuel, MOGAS, AVGAS, E120 Lube, and contaminated fuel and sludge. A small quantity of JP-4 is stored for Air Force use.

6.1.3.1 Tank Farm. The tank farm is located west of Runway 23 off of London Bridge Road. Eight storage tanks are located in the complex (F11-16, F19, and F19A) JP-5 is transported to the tank farm by a pipeline which is owned and operated by W. R. Grace Company. There have reportedly been numerous leaks associated with this pipeline. Five 567,000-gallon tanks (F12-16) currently hold JP-5 and were constructed in 1951. Two 25,000-gallon tanks were also constructed in 1951. Although currently not in use, they recently were used to store No. 2 fuel oil. The 420,000-gallon tank (F11) was constructed in 1965 and is also used to store JP-5. Leakage of fuels from the five large tanks (F12-16) was documented through field investigation (R. E. Wright Associates, February 1983).

Fuel leakage at the Tank Farm is known to have occurred both at the surface and underground. The tanks are known to have leaked for more than a decade, although the volumes lost are unknown. Test boring/monitoring wells installed at the Tank Farm indicate thousands of gallons of fuel are floating on the water table in the vicinity of the tanks. To prevent future leakage of fuel, underground transfer lines have been moved above ground, and the base of these tanks is currently being resurfaced with concrete and fiberglass. Conclusions of recently completed field investigations by Wright Associates are presented in Chapter 8.

6.1.3.2 Day Tank. A 220,000-gallon day tank (F20) is located just east of Runway 23. This tank was constructed in 1952. The day tank is connected by pipeline to the Tank Farm and currently stores JP-5. The tank is used to fill the ten rapid refueling pits located adjacent to Runways 32 and 23. A system of filters is used to remove any impurities in the jet fuels. Filters are changed every three years and are disposed of in the sanitary landfill. Condensate formerly was drained to a dry well adjacent to the tank. Currently, the condensate is automatically pumped to an oil/water separator. The water is discharged into the depression near the tank.

There is a history of fuel leakage and spills associated with the day tank. During the 1960s there was a reported 80,000-gallon overfill at this tank. Since that time, substantial overfills of the tank have been reported in 1979 and 1981 (R. E. Wright Associates, 1983). More recently, slow leaks were detected in the subsurface fuel evacuation lines from the refueling pits. Although the return evacuation lines are no longer used, this leakage may have occurred between 1952 and 1983.

According to recent field investigations, the loss of fuel from the Day Tank has resulted in the seepage of significant amounts of fuel into the ground (R. E. Wright Associates, 1983). There is no evidence that fuel from this source has accumulated in large enough quantities to enable it to be mobile in pure form. Rather, it has probably dispersed to such an extent that it is largely retained in the soil by capillary action. Conclusions of a recent field investigation at the day tank are provided below.

> The leakage of fuel from the buried evacuation pipeline, however, has resulted in the accumulation of pure fuel, perhaps a few thousand gallons, that is floating on the water table. There appears to be little potential for the migration of pure fuel away from the site. The greatest environment risk resulting from the continuing presence of subsurface fuel at the Day Tank is expected to be the on-going contamination of groundwater by dissolved fuel. Based on the local topographic setting, the distance from the Day Tank to a point of potential groundwater discharge is probably at least a mile. Because of this, dissolved fuel contained in the shallow groundwater system would

> probably be reduced to insignificant concentrations before reaching any downgradient points of discharge (R. E. Wright Associates, 1983).

6.1.3.3 Steam Plant. A 324,000-gallon tank (P602) is located adjacent to the steam plant and is currently used to store No. 6 fuel oil. This tank was constructed in the early 1950s. A 1,500-gallon spill occurred in 1976 and has since been cleaned up.

6.1.3.4 Abandoned Tank Farm. The abandoned tank farm is located approximately 300 yards east of the old CPO Club on the old North Station. There are two concrete 50,000-gallon tanks (G5 and G6) that were formerly used to store aviation gas during the operation of North Station. A number of smaller aboveground tanks formerly stored kerosene and lube oils. At least two buried lines exist at the abandoned tank farm by which wash fluids from tanks and pipes were drained to waste. The 50,000-gallon tanks were emptied of fuel and filled with water with the decomissioning of North Station. Tank G-5 was later used to store waste oil. It is no longer used for this purpose, but the tank is thought to still contain a foot of oil, or about 5,000 gallons.

Recent field investigations have shown that small amounts of fuel have leaked from either the tanks or buried pipeline and persist in the subsurface at the abandoned tank farm (R. E. Wright Associates, 1983). Conclusions of this study are provided below.

> There is no evidence, however, of any free product mobility. The relatively small amount of fuel which occurs in the subsurface appears to be bound in the soil by capillary action. Fuel was observed both above and below the water table, and was probably dispersed in that manner by water table fluctuations. Ground water at the site generally flows north to northeast, and may discharge into nearby shallow drainage ditches that flow north toward Potters Road. It is likely that ground water downgradient (north) from the site contains low levels of dissolved fuel. However, in view of the small volume of subsurface fuel that was observed at the site, the dissolved fraction in the ground water is expected to be so low that it is probably insignificant.

6.1.3.5 Waste Oil Storage. Until recently, waste oil was stored in three 1,000-gallon tanks located adjacent to the tank truck. Overflow problems and spillage into the adjacent creek became so widespread that tank use was discontinued. A new 25,000-gallon aboveground tank (F-55) has recently been constructed at this location and will provide waste oil storage in the future. Since 1979, waste oil from the Fuel Division storage facility has been taken to an aboveground bermed storage tank in the fire pit area on the west side of the base for use in fire fighter training. Throughout the 1970s, waste oil was stored in Tank G-5 at North Station awaiting sale to an oil recycling firm or transport to Brookhaven National Laboratories in New York.

6.1.4 Pesticide Storage. Pesticides have been stored in Building 821, located just behind Building 820 in the Public Works Department compound, since 1968. Prior to that, they were stored in Building 756 in the Evaluation of Base Construction area. Various pesticides are stored, including 2,4-D, 2,4,5-T, heptachlor, aldrin, chlordane, and Warfarin. DDT was stored in Building T5-6 prior to the DDT ban. Pesticide storage and use is the responsibility of the General Services Branch (Maintenance Division) of the Public Works Department.

Pesticides are also stored in the golf course barn (Building 758). Those stored for use in and around the golf course are Daconil, Chiopco 26019, and Turstan (fungicides); Daconte

6 (herbicide); and Oursban (insecticide). The storage, preparation, and use of these pesticides are the responsibility of the Recreational Facilities Division in the Special Services Department.

6.1.5 Polychlorinated Biphenyl Storage. Large electrical components known by label information to contain PCBs are stored on a gravel pad, against the southwest fence of the Public Works Transportation Yard (adjacent to Building 830). In early 1984, there were four sound PCB-containing units awaiting disposal. At the time of a station-wide inventory of PCB electrical components in 1976, there were no PCB units stored in this location. Information on transformer storage prior to 1976 was not available. Three retired PCB-containing capacitors are stored on uncurbed asphalt, with many small non-PCB transformers in the yard immediately northeast of Building 402. A PCB transformer stored in the yard for disposal leaked a significant quantity of PCB material in 1982. This spill was cleaned by a contractor and disposed off-base.

6.1.6 Storage Lots and Scrap Yards. The Public Works Department maintains a large storage lot behind its transportation maintenance building (830) for vehicles and parts and large electric components awaiting disposal. This lot has been in use since the early 1950s. There is a one and a half acre construction staging area just south of the Public Works compound along London Bridge Road that contains discarded railroad ties and large iron plates. This area has been used intermittently for storage and scrap since the late 1950s.

6.1.7 Decontamination Material Storage. The Public Works Department keeps hazardous waste cleanup equipment and supplies in a shed inside the hazardous waste storage area at the Avenue D landfill entrance. Other cleanup materials and equipment are maintained by the station's Safety Officer and by the Fire Prevention Branch of the Air Operations Department.

6.2 INDUSTRIAL MATERIAL AND WASTE TRANSPORTATION

6.2.1 Supply Materials. The shipment of almost all material both to and from NAS Oceana is controlled by the Material Division of the Supply Department. The transfer points of supply materials are the Supply Department warehouses (Buildings 720-22).

6.2.2 Petroleum, Oil and Lubricants. The Fuel Division of the Supply Department operates facilities and equipment for the delivery of aviation fuels and bulk lubricating oils alongside aircraft, and for transporting fuels drained from aircraft. JP-5 is barged from the Naval Supply Center Fuel Depot on Craney Island, Portsmouth, Virginia, to the North Landing River and pumped by pipeline to the fuel farm located on the west side of the station. From there, fuel is pumped across the field to holding tanks, called day tanks, and thence to the direct fueling stations.

6.2.3 Hazardous Wastes. Public Works hazardous waste pickup has removed industrial wastes from base and tenant activities at Oceana since September of 1981. A shop or activity that generates industrial wastes is responsible for placing wastes in marked, properly segregated containers and sealing the containers for pickup. When a pickup is needed, the shop/activity fills out Form 1348 and calls the Public Works Trouble Call desk to request a hazardous waste pickup. Wastes are picked up from the shop/activity and taken to the hazardous waste storage facility, a fenced area located near the Avenue D landfill entrance behind the Public Works Building. Typical waste pickups include paint, thinners, xylene, methyl ethyl ketone, toluene, methyl isobutyl ketone, strippers, PD-680 (solvent/gun cleaner), lacquers, and enamel. The hazardous wastes storage facility serves as a pickup point for the DPDO.

The Operations Branch also cleans and maintains oil booms in stormwater drainage ditches on the station. The booms intercept floating fuel and oil from spills that have been washed off runways and maintenance pads in the hanger area. Each boom is visually inspected twice per day. When a ditch must be cleaned, floating trash is skimmed off by dip nets, placed in barrels, and hauled to the hazardous waste storage facility to be removed by DPDO. Waste oil is pumped off of the water surface by an oil skimmer and taken to the waste oil tank in the Supply Department yard.

6.2.4 <u>Solid Waste.</u> Nonhazardous solid waste on the base is placed in dumpsters by the generating unit. These are picked up on a regular basis and are carried to the Avenue D landfill for disposal. Prior to 1961, wastes were carried to the Fifth Green Landfill (1954-1961), the North Station Landfill (1945-1954), and the West Side Landfill (1941-1945). Solid waste from NALF Fentress has been delivered to the Avenue D Landfill since 1970. Prior to that, Fentress's solid waste was burned and buried in a landfill at the north end of Runway 23. Destinations for solid wastes during the four-decade operation of Oceana are summarized in Table 6-1. Their locations are shown in Figure 6-1. Placement of hazardous waste in the base landfills stopped in 1982 with the implementation of the Public Works hazardous waste pickup program.

6.3 ORDNANCE. Out-of-date or defective ordnance is either sent directly to Naval Weapons Station Yorktown by truck or picked up by Explosives Ordnance Detachment (EOD) Division 2. Ordnance which is picked up by EOD Division 2 is stored in Magazine 12 at Little Creek Naval Amphibious Base until shipment to Yorktown for disposal.

6.4 RADIOLOGICAL. Except for recycled radiation sources used in for nondestructive testing, there is no radiological material used at NAS Oceana and thus no radiological waste is generated.

Table 6-1

Destinations for Solid Waste Transported from Generating Activities at NAS Oceana

Waste Disposal Area	Period of Use	Function	IAS Site Number
West Side Landfill	1941 - late 40's	general base landfill	Site 3
Old Salvage Pile	Mid 40's - mid 50's	scrap metal storage	not a site
North Station Landfill	Early to mid 50's	general base landfill	Site 8
Fifth Green Landfill	1954 - 1961	general base landfill	Site 7
Avenue D Landfill	1961 - present	general base landfill	not a site
Potters Road Inert Material Disposal Area	Early 70's - present	inert construction/ demolition debris	not a site
Asbestos Landfill	1980 - present	Asbestos	not a site
Bouganville Disposal Area	1976 - present	dead vegetation, furniture (unregulated disposal)	not a site

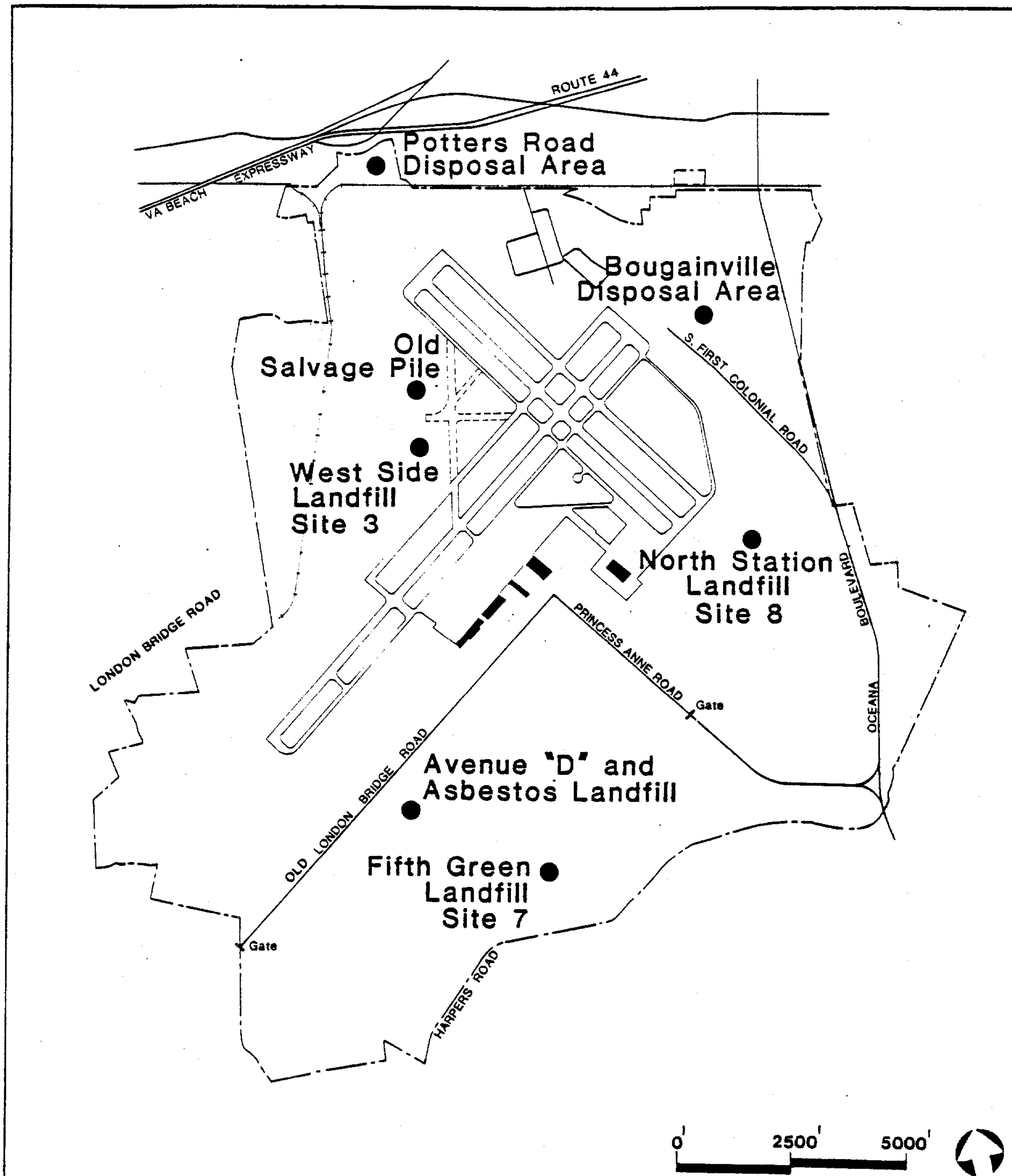

Figure 6-1
Location of NAS Oceana Landfills and Disposal Areas, 1941-84

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7. WASTE PROCESSING

7.1 WASTEWATER TREATMENT. Since the mid-1970s, Naval Air Station (NAS) Oceana has been connected to the Hampton Roads Sanitation District collection system. Prior to that, sanitary sewage generated on station received treatment at the Navy-owned plant located in the northwestern corner of the station (Buildings SD1-10). This plant was put into operation in 1951 and replaced another plant 1,500 ft to the northeast that was demolished because it would have obstructed aircraft maneuvers on Runway 14R. Treated effluent was discharged to a drainage ditch that leaves the base on its western edge. Sludge was routinely disposed of by land spreading on the western sides of the base, giving it away as fertilizer, and landfilling. In 1983-84 the inactive sewage treatment plant was demolished and the debris carried off-base for disposal. Residual sludge in the tanks was trucked to the main pumping station (SD-600), where it was added to the effluent.

Septic tanks with leach fields provide sewage treatment to several isolated buildings at Oceana: Buildings 197/199, 280, 3000, 3015, 3030, R31, R34, and R36. These septic tanks occasionally have perculation problems and flood during heavy rainfall. At NALF Fentress, sewage is treated in two aerobic lagoons. The treated effluent is sprayed on a nearby field. Sludge was taken to the landfill.

7.2 WASTE FUEL AND SOLVENT RECYCLING. Waste bowsers for fuel, lube oil, and hydraulic fluids are located throughout the flight lines and industrial areas of the station. When the bowsers are full, the shop responsible calls the Fuel Division for a pumpout by the Division's waste fuel tank truck. A shop can pick up an empty bowser from the Fuel Division or can request delivery of one from the Public Works Department.

Until recently, the shop using the bowser was responsible for transporting the full bowser to the Fuel Division yard for waste fuel transfer to one of three 1,000-gallon tanks. However, overflow problems and spillage into the adjacent ditch became so widespread that tank use was discontinued. A new 25,000-gallon aboveground tank (F-55) was recently constructed at this location and will provide waste fuel and oil storage in the future. This tank will be supervised by Fuel Division personnel.

In the 1950s and 1960s waste fuel and oil were dumped into an oil disposal pit in the field to the west of the fire fighter training area. Throughout the 1970s, waste oil was stored in Tank G-5 at North Station, awaiting use by the Fire Prevention Branch, sale to an oil recycling firm, or transport to Brookhaven National Laboratories in New York. Since 1979, waste fuel and oil from the Fuel Division storage facility has been taken to an aboveground bermed storage tank in the fire pit area on the west side of the base for use in fire fighter training. During this period, all waste fuel and oil was used by the Fire Prevention Branch. This amounts to approximately 25,000-40,000 gallons of waste fuel and oil per year.

Sludge removal from fuel tanks is subcontracted and the waste is disposed by the contractor off the station. This policy has been in practice since at least 1971. Descriptions of previous practices were unavailable.

Oil removed from the many oil/water separators and ditch oil booms on the base during routine maintenance by the Public Works Department is taken directly to the fire pit area for storage.

Other solvents are not recycled at Oceana; they are placed in drums by the generating shop, properly labeled, and transported by Public Works to the hazardous waste holding area at the entrance to the Avenue D landfill, where they are eventually picked up by the Defense Property Disposal Office (DPDO). Prior to 1981, these other solvents were put into the bowsers along with the waste oil, fuel and hydraulic fluid. The Supply Department is responsible for the proper identification of the wastes and releasing them to DPDO at the time of pick-up.

7.3 CLINICAL WASTES. The laboratory at the Naval Regional Medical Center generates small volumes (less than 1 gallons/month) of iodine, alcohol, and acetone wastes. These are washed down the sink into the sanitary sewer. Biological waste from the laboratory is sealed in special containers and sent to Portsmouth for disposal.

Scrap amalgam, x-ray film, and spent x-ray fixing solutions from the Naval Regional Dental Center are sent to Norfolk for mercury and silver recovery.

7.4 ORDNANCE. The Weapons Department is responsible for supply and storage of all ordnance employed at NAS Oceana. No disposal or processing of ordnance is made at Oceana. Out-of-date or defective ordnance is either sent directly to Yorktown or is picked up by Explosives Ordnance Detachment Division 2, temporarily stored in Magazine 12 at Naval Amphibious Base, Little Creek, and then shipped to Yorktown.

8. DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS

8.1 SITE 1-WEST WOODS OIL DISPOSAL PIT. In the mid-1950s a pit roughly 25 feet in diameter was dug for disposal of waste oil, fuel, hydraulic fluid and other non-aqueous liquid wastes from the aircraft maintenance and repair shops. The pit was located about 1,000 feet west of old Runway 9 at its intersection with an old taxiway (Figure 8-1). The pit was used until the late 1960s, when a large storm caused flooding in the area. The flood waters floated the oil from the pit and carried it off base, where it contaminated privately owned land. The complaints arising from this event resulted in termination of this oil disposal method and the filling of the pit with earth. The pit was not visible on 1971 aerial photographs of the area, and a field check in early 1984 failed to discover its location. The pit is associated with a 1,000-foot long ditch that began at the edge of old Runway 9. This ditch was used to dispose of waste fuel and oil when wet ground conditions prevented truck access to the pit. After wastes were dumped in the ditch, they were ignited.

It is known that petroleum, oil, and lubricants (POLs) and other aircraft maintenance chemicals were also sold to a waste oil recycler, were used to control dust on unpaved roads, and were dumped behind line shacks, so it is difficult to attribute a precise volume to the oil disposal pit.

The hazardous wastes and their volumes that were placed in the disposal pit are assumed to be half of the totals placed in waste oil bowsers by the various shops during the period 1955 through 1970 as listed in Table 5-1. These hazardous wastes and amounts are shown in Table 8-1. According to the table about 70,000 gallons of waste fuel, oil, hydraulic fluid, PD 680, paints, and paint sludges, thinners, and strippers, naptha, B&D 3400 engine cleaner, agitine, and trichlorotrifluoroethane were placed in the pit. Benzene, toluene, and their derivatives are commonly used in paint stripping formulations.

Spillage around the edges of the pit visible on aerial photographs between 1958 and 1965 indicate that the pit was full and that oil wastes, under the pressure of their own weight, moved laterally into the soil above the water table.

The pit's location is about 250 feet east of a drainage ditch that flows north toward the old sewage treatment plant site, then off base to the west. There is concern that aircraft fuels (JP-4, JP-5, AVGAS), lubricating oils, and hazardous chlorinated and aromatic hydrocarbons pose a threat to surface and ground water quality in the area.

8.2 SITE 2-LINE SHACK OIL DISPOSAL AREAS. There are five line shacks that have POL and Hazardous liquid disposal areas associated with them (Figure 8-2). All of these line shacks were constructed in 1963. All display oil-soaked ground over roughly 1,000 to 2,000 square feet or more.

Estimations of wastes disposed behind the line shacks are based on hazardous waste generation rates listed in Table 5-1. It is assumed that 25 percent of all hazardous wastes generated by MATWING and the fighter squadrons was disposed on the ground behind the line shacks between 1963 and 1976 and that ten percent of the same wastes were dumped there between 1977 and 1984. The wastes generated by MATWING are assumed to have been equally divided between line shacks 125 and 131; similarly, the wastes generated by the fighter squadrons are allocated equally between line shacks 33 to 33, 109, and 400. Table 8-2 lists the estimated wastes per line shack.

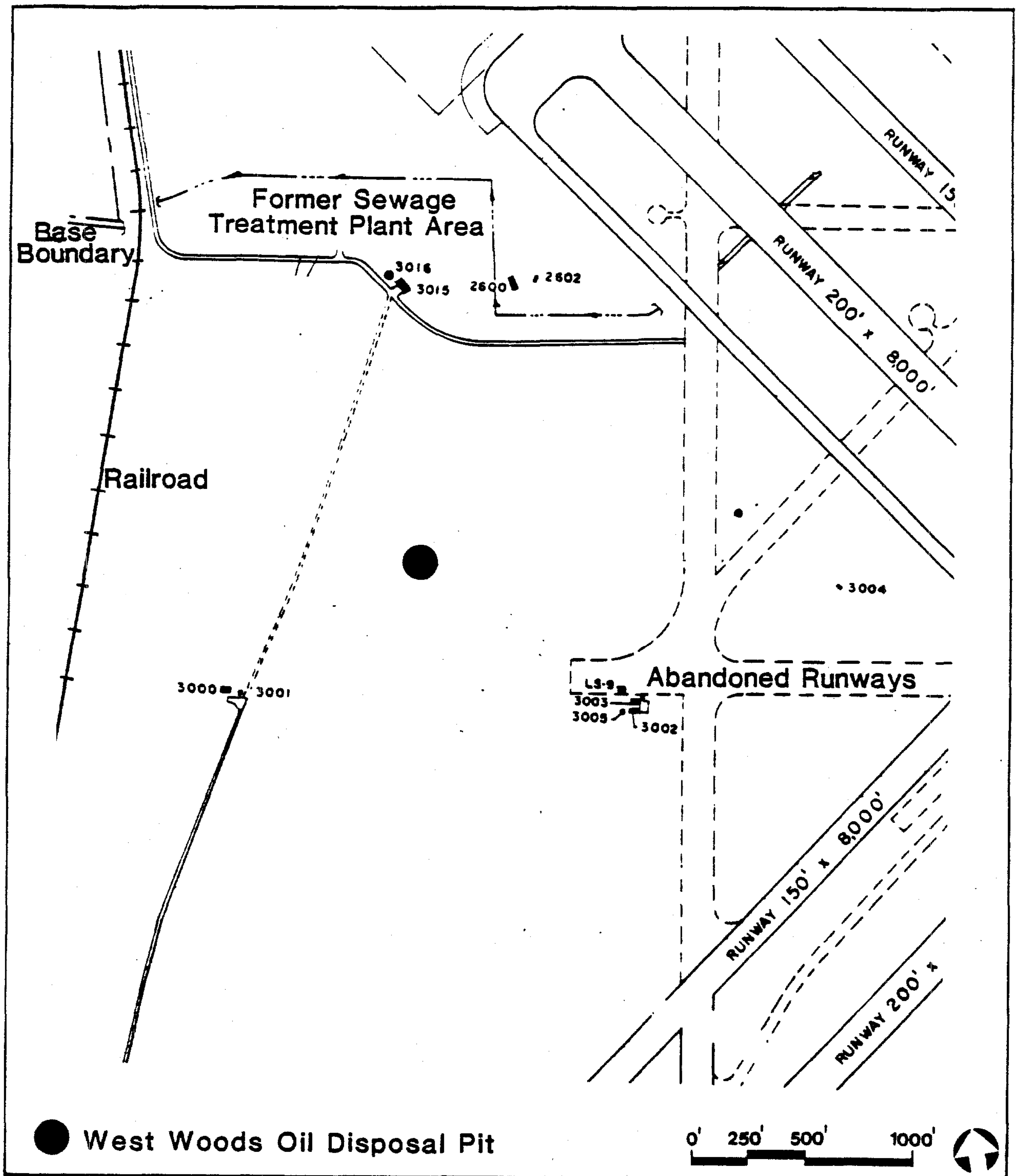

Figure 8-1
Site 1, West Woods Oil Disposal Pit

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Table 8-1

Hazardous Wastes Disposed in

the West Woods Oil Disposal Pit

(mid 1950s - late 1960s)

Hazardous Waste	Approximate Volume[1] in Gallons
Waste Fuel Oil and Hydraulic Fluid	70,000
Paints, Paint Thinners, Strippers, and Sludges	7,000
PD 680	22,000
Naptha	8,000
B&D 3400 Engine Cleaner	2,700
Agitine	200
Trichlorotrifluoroethane	10
Total Volume (approximate)	110,000

[1] The volumes shown are one-half of those known to have been disposed in waste oil bowsers between 1955 and 1970.

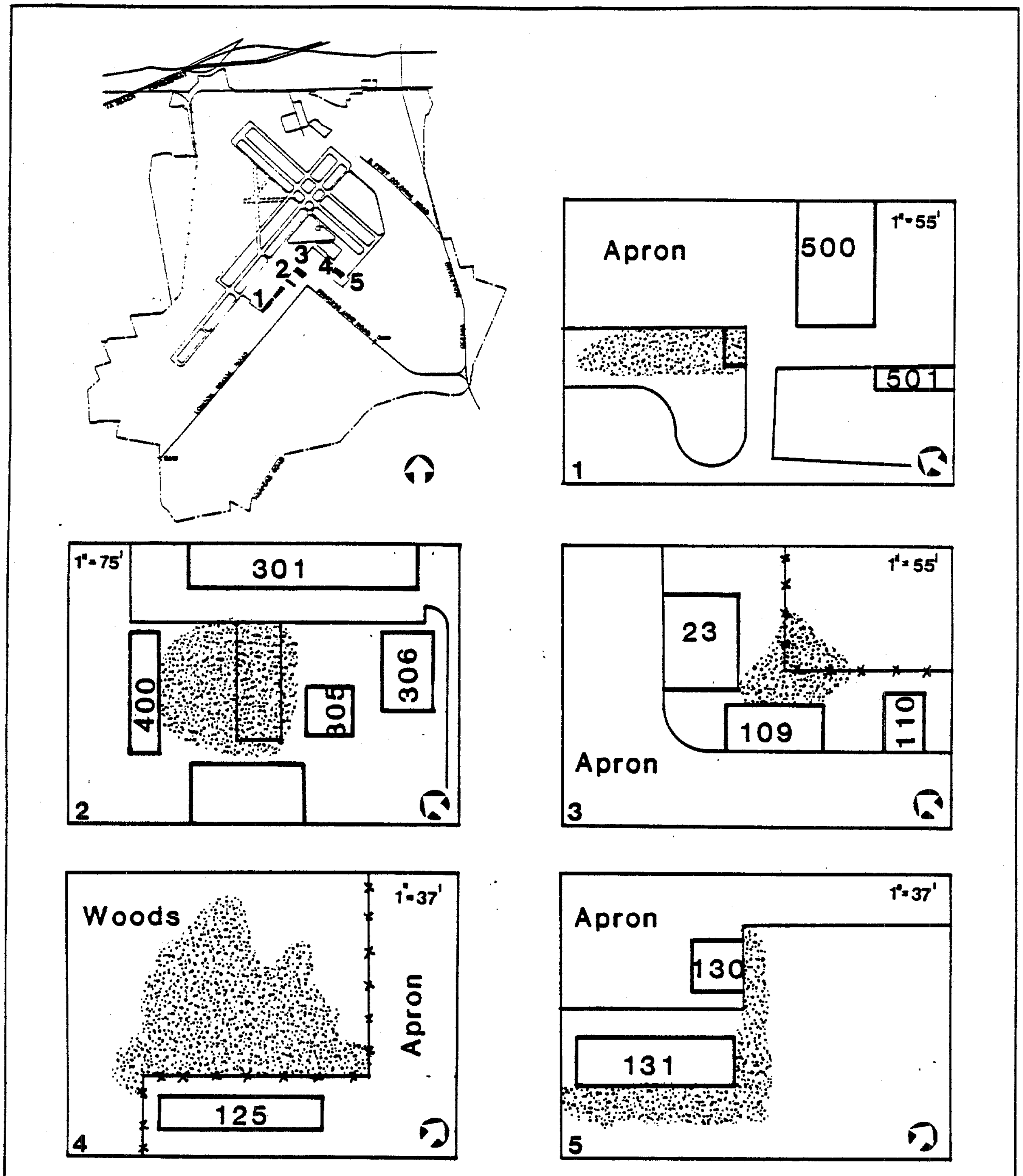

Figure 8-2
Site 2, Line Shack Oil Disposal Areas

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Table 8-2

Hazardous Wastes Disposed behind

MATWING and Fighter Squadron Line Shacks

Hazardous Waste	MATWING Line Shacks 124 and 131: Estimated Gallons per Line Shack Disposal Area	Fighter Squadron Line Shacks 31-33, 109, and 400: Estimated Gallons per Line Shack Disposal Area
PD 680	2,400	6,500
Oil and Hydraulic Fluid	4,100	2,900
Paint Strippers, Thinners, Turco	600	200
Naptha	-	4,500
B&D 3400 Engine Cleaner	-	1,500
TOTAL VOLUME	7,100	15,600

The estimates presented in Table 8-2 indicate that the fighter squadron line shack disposal areas are more contaminated that those at MATWING, even though the area behind MATWING line shack 125 appears more grossly contaminated than any of the others. All the line shack disposal areas are on sandy soils. They are at various distances to drainage ditches ranging from about 100 feet to 1,200 feet.

8.2.1 **Line Shack 400.** Oil disposal area for Line Shack 400 is located on a barren area southwest of the building between the concrete pad and the old test cell. Recently this area was paved with an 18 inch layer of concrete for the wash rack. It is not known if the oil-saturated soil was removed and if so, where it was taken for disposal. This area is visible on the 1971 aerial photos. Line Shack 400 is about 500 feet from the closest drainage ditch.

8.2.2 **Line Shack 109.** There is a POL disposal area on the ground behind Line Shack 109. The disposal area extends along the fence; there are also a waste oil bowser and hazardous waste drums on the ground along the fence. Reportedly, waste oil has been dumped with a specially fashioned funnel into an electrical manhole near this line shack, resulting in damage to circuits and requiring cleanup. Line Shack 109 is about 1,000 feet from the nearest drainage ditch.

8.2.3 **Line Shack 125.** There is a waste POL disposal area on the ground behind Line Shack 125. In the early 1980s, this line shack was slowly sinking into the asphalt, which was being dissolved by the waste oil that had been dumped over the adjacent fence for many years. During the construction of a new concrete pad for the line shack, a bulldozer sank several feet into oil-saturated soil after the asphalt had been scraped away. Eventually, about six feet of oil-saturated soil was dug out by the Construction Battalion before the new concrete pad could be poured. The disposal area of this soil is unknown. Line Shack 125 is about 1,200 feet from the closest drainage ditch.

8.2.4 **Line Shack 131.** There is a POL disposal area behind Line Shack 131. This area is about 100 feet from a drainage ditch.

8.2.5 **Line Shacks 31-33.** There is a POL disposal area on barren soil between Line Shacks 31-33 and the aboveground steam line to the west. The disposal area is about 800 feet from the closest drainage ditch.

8.3 WEST SIDE LANDFILL. A landfill used in the first years (1941-45) of base operations is located on the west side of the base, about 1,000 feet south of Site 1. It appears on a 1945 map of the base with the annotations: dump, dump pit, broken concrete, ditch being filled with debris (see Figure 8-3). By 1945, the site had been graded. It is likely that this site served as the station landfill during its early construction and is therefore likely to contain a large proportion of construction debris. Apart from the 1945 map there is no other information available about this site. Based on information in Table 5-1 and an assumption that the base in this period generated about a third of the hazardous wastes that it did in the 1946-84 period, this site can be expected to contain roughly 60 pounds of asbestos, 400 gallons of paints and thinners, and 24 pounds of pesticide residues.

8.4 SITE 4—BOUGAINVILLE MERCURY SPILL. Mercury from spills cleaned up at the new test cells (Buildings 1100 and 1102) was placed in boxes and carried to the Bougainville area for storage in 1975. Later (1983) when the boxes were discovered, they were carried to the Air Intermediate Maintenance Department. They are estimated to contain between 10 to 50 pounds of mercury. During the transfer, some mercury leaked

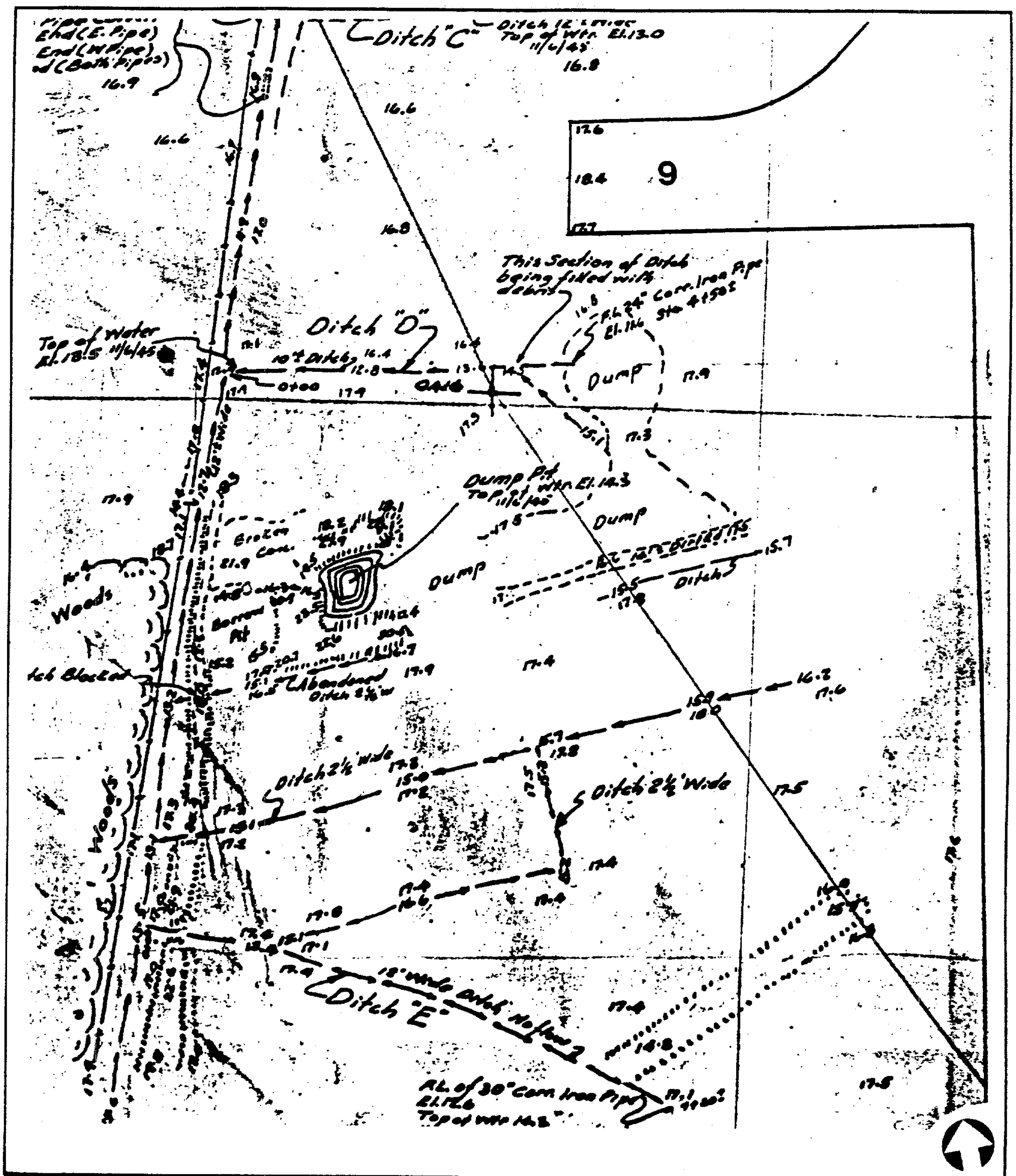

Figure 8-3
Site 3, West Side Disposal Landfill

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from the boxes. It is inferred that mercury may have been spilled at Bougainville during the loading operation (Figure 8-4). Soil samples in the area were taken for testing in 1984. The results reported by COMNAVFACENGCOM letter of 25 May 1984 to Commanding Officer Oceana indicate that there is no contamination at the site. Thus additional confirmation study of this site is not needed at this time.

8.5 SITE 5 - OLD STATIC ENGINE TEST CELL MERCURY SPILL. The old static engine test cell was located in Building 305 and was in use from 1965 to about 1973 (Figure 8-5). The control room and material stored in it are visibly contaminated with metallic mercury, and there is a potential for the area outside the control room also to be contaminated.

Metallic mercury from manometers was released when these manometers were broken or overpressurized. Approximately one pound of metallic mercury is visible in cracks on the floor of the test cell control room, and there is a potential for additional mercury in the soils outside the control room. Since the old test cell was in operation about the same length of time as the new test cells and since there is no record of mercury cleanup at the old test cell, an upper limit of 10-50 (lbs) mercury spilled at the old test cell is estimated.

Metallic mercury present in the confined area of the control room presents a potential hazard to human health due to inhalation of mercury vapors. Uncurbed paved surfaces outside the control room are sloped toward a soil that could be contaminated.

8.6 SITE 6 - NAVY EXCHANGE MAINTENANCE BUILDING WASTE OIL DISPOSAL AREA. During the 1970s, about 15 gallons per year of motor oil were dumped on the ground next to a fence adjacent to the Navy Exchange Maintenance Building 518 (Figure 8-6). Although the site, running for 25 feet along the fence, is visually unpleasant, it does not pose a significant threat to ground or surface waters due to the low total volume of oil disposed of and its distance to drainage ditches.

8.7 SITE 7 - FIFTH GREEN LANDFILL. The station landfill used between 1954 and 1961 was located on four acres of land where the fifth hole of the base golf course is today (Figure 8-7). The landfill was used to dispose of solvents, pesticides, mixed municipal wastes, construction debris, electrical conductors and transformers, and sanitary, photolab and non-hazardous hospital wastes. Wastes were burned and the residual buried. In the early 1960s, the landfill was covered, graded, and planted to be reclaimed for recreational use as part of the station golf course. Table 8-3 lists amounts of hazardous wastes likely to be in the landfill based on information in Table 5-1. The figures shown assume that 10% of flammable substances survived burning. Based on recent retirement rates of PCB transformers -- approximately four, 320-gallon capacity units per decade -- it is estimated that obsolete or damaged transformers containing about 1,000 gallons of PCBs were placed in the landfull over its lifetime.

8.8 SITE 8 - NORTH STATION LANDFILL. A landfill that served the North Station area and the construction activity of the new facilities in the 1950s was located about halfway between the end of Runway 32R and the intersection of Oceana Boulevard and South First Colonial Road, along a construction access road (Figure 8-8). It covered about an acre and its use was terminated in 1954. The area is presently covered with bushes and trees. Based on aerial photographs of the period before and during its use it appears to have been the site of a farmhouse that was demolished in the early 1950s. Soon afterward it may have been used as a borrow pit, which created the water-filled depression into which debris and refuse from the base was placed.

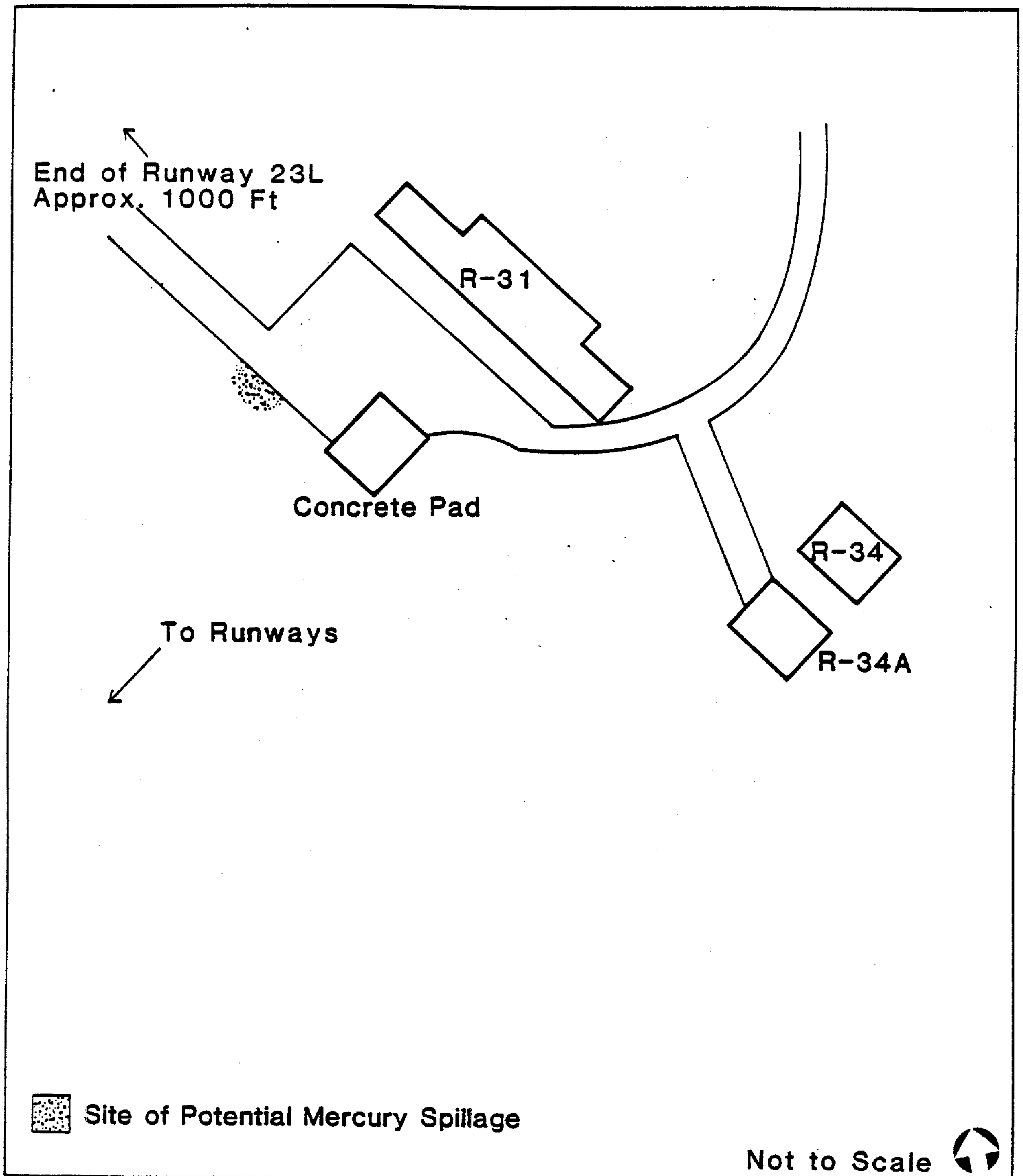

Figure 8-4

Site 4, Bougainville Mercury Spill

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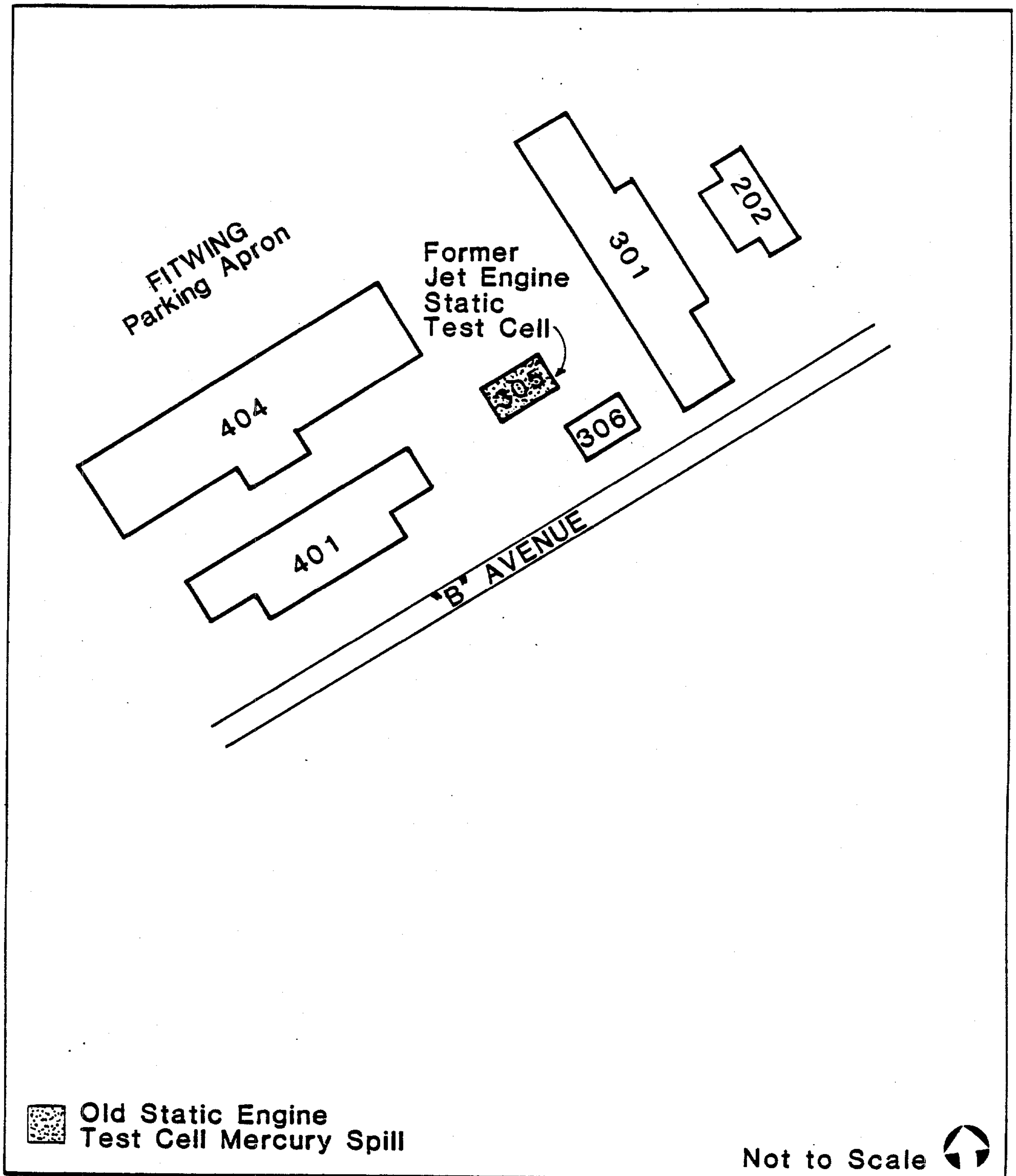

Figure 8-5

Site 5, Old Static Engine Test Cell Mercury Spill

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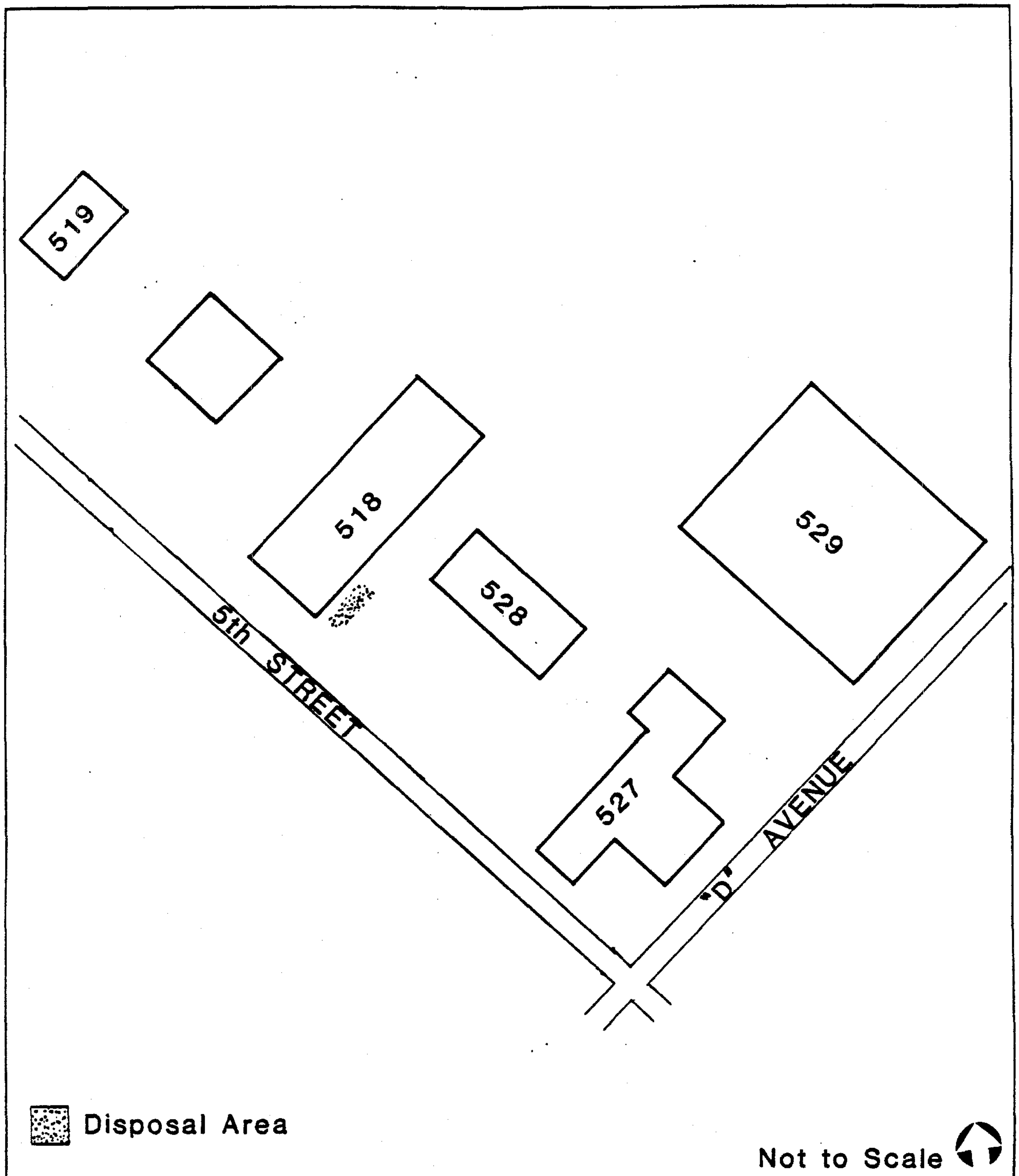

Figure 8-6

Site 6, Navy Exchange Maintenance Building Oil Disposal Area

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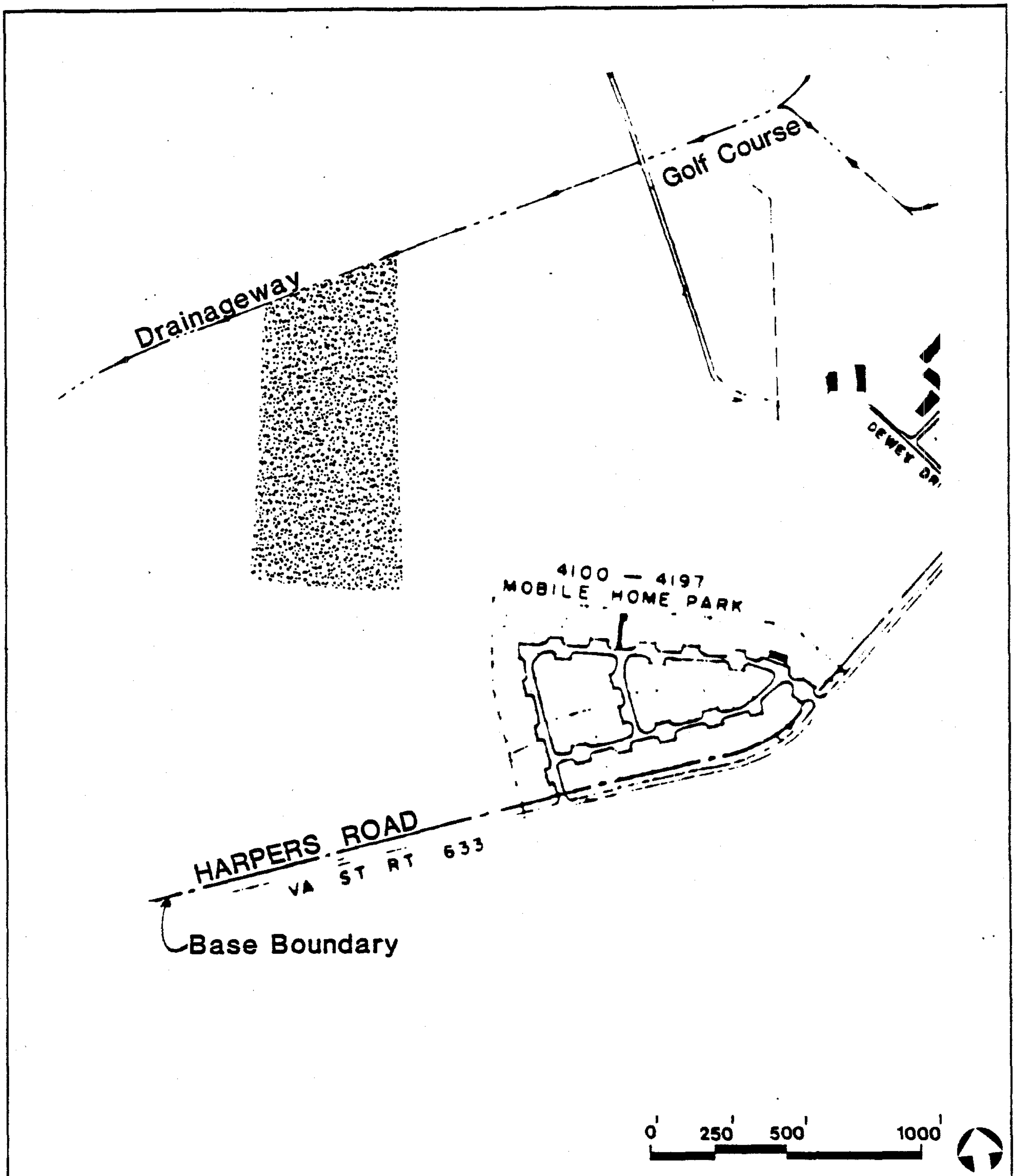

Figure 8-7
Site 7, Fifth Green Landfill

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Table 8-3

Hazardous Wastes Disposed in

the Fifth Green Landfill:

Residuals from Burning (1955-61)

Asbestos	1,400 lbs
Waste Paint and Thinner	235 gal
Pesticide Residues	11 lbs
Motor Oil	51 gal
Dichlorodifluoromethane	70 gal
PD 680	4 gal
Photo Lab Wastes (as Silver)	4 lbs

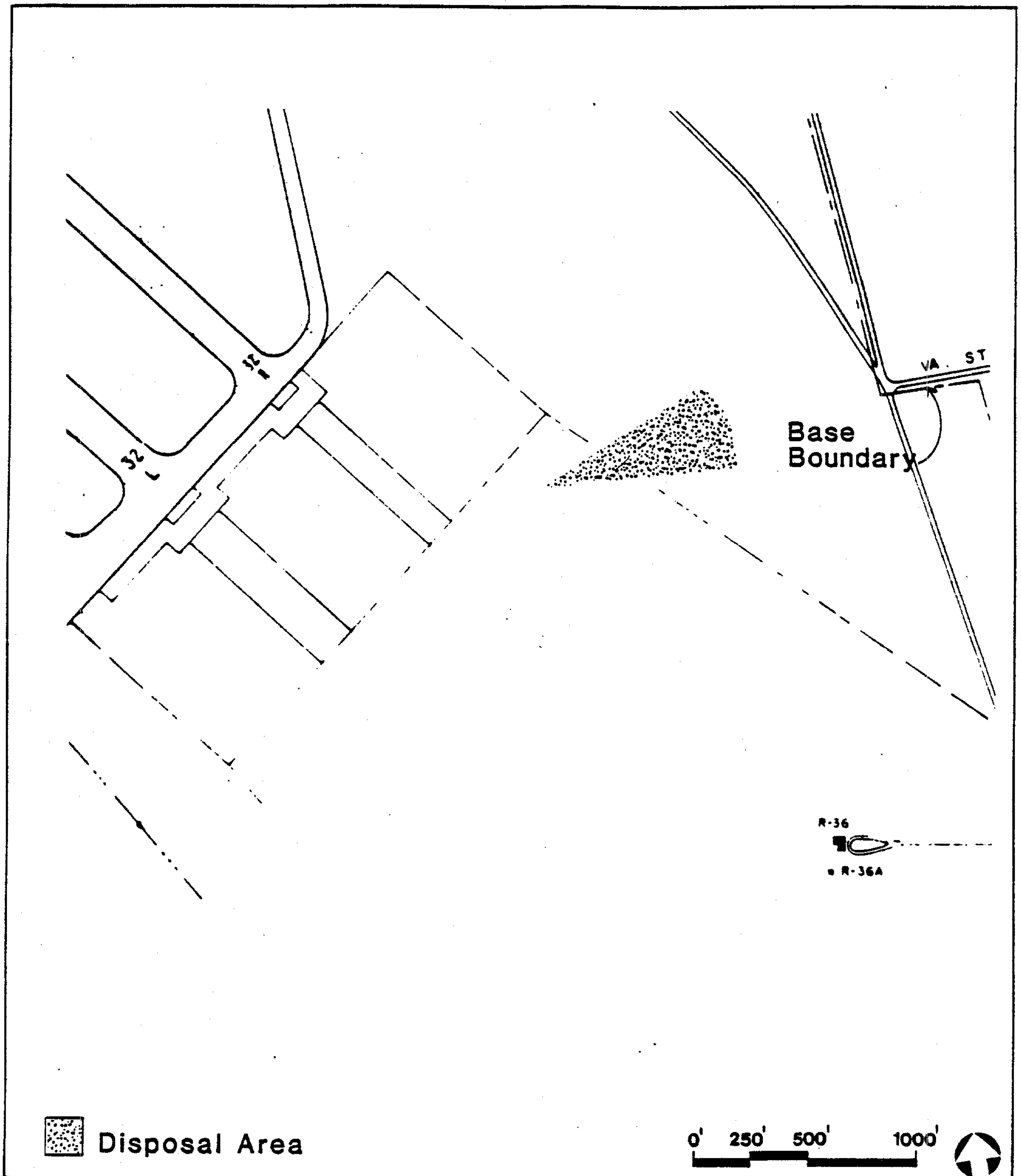

Figure 8-8
Site 8, North Station Landfill

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Wastes thought to have been placed in the landfill include solvents, pesticides, construction debris, municipal wastes, electrical conductors and transformers, and sanitary, photolab, and non-hazardous hospital wastes. Table 8-4 lists the amount of hazardous wastes likely to be in the landfill based on information in Table 5-1. Based on recent retirement rates of PCB transformers — approximately four, 320-gallon capacity units per decade -- it is estimated that obsolete or damaged transformers containing about 500 gallons of PCBs were placed in the landfill over its lifetime.

8.9 SITE 9 - CONSTRUCTION STAGING AREA. There is a one and one half acre area along London Bridge Road opposite the Weapons Department complex that has been used intermittently since the late 1950s as a construction staging area (Figure 8-9). Inspection revealed several hundred old bleached railroad ties, piles of large rusty iron plates, and buckets filled with iron plate fasteners. The old railroad ties were decayed and showed no signs of creosote. No hazardous wastes were noted.

8.10 SITE 10 - AIR COMPRESSOR YARD. Air compressors used for starting jet engines are operated and maintained by the Utilities Division of the Public Works Department. They are located across the taxiing lane from Line Shack 125 and were installed in 1973 (Figure 8-10). Until 1979, oil condensate from the compressed air was released to the ground just outside the compressor area. About 180 gallons per year of oil was disposed of in this manner. In 1979, a drain and oil separator was installed to catch the oil, but since the oil is released under pressure, oil in the separator was blown out. In 1981, a flow restrictor was installed to correct the blowout problem, but then the oil/water separator was found to have been installed with its tanks reversed. Finally, in 1983, the separator was reinstalled and is now functioning properly. Thus, about 1,800 gallons of oil were lost over a 10-year period. There is a JP-5 bowser resting on gravel just outside the compressor area. Overfilling and overflow due to fuel expansion in hot weather have resulted in the loss of fuel to the ground adjacent to the compressor yard.

8.11 SITE 11 - FIRE FIGHTER TRAINING AREA. The Fire Prevention Branch has used a part of abandoned Runway 18-36 on the west side of the base for fire fighting training exercises since the early 1960s (Figure 8-11). Two practice fires are lit each weekend, weather permitting. Until the mid-1970s, 50 to 75 gallons of waste fuel, oil, hydraulic fluid, and other aircraft maintenance chemicals including chlorinated and aromatic hydrocarbons were poured in the center of the runway, lit, then extinguished. Although a small fraction of the fuel remained unburned on the pad after the exercise, it was usually not enough to drain or be washed off the flat surface of the runway. In the mid-1970s, a fire pit was built consisting of an earthen berm, about 75 feet in diameter, resting directly on the runway. Due to the better containment provided by the fire pit, about 300 to 500 gallons of oily wastes per exercise is placed in the pit for burning. If the pit fills with water from the exercise or rainfall, it is pumped out from the pit bottom to prevent oil floating on its surface from escaping the confines of the berm.

The Fire Prevention Branch has used about 2,000 gallons or less of Aqueous Film Forming Fluid (AFFF) per year since 1969, mainly in its training exercises at the fire pit. Reportedly, most (over 80 percent) of the AFFF and the fuel is burned and/or swept into the air by updrafts created by the fire.

Based on the figures provided, it is estimated that 6,000 gallons of waste fuel and other chemicals per year were used in fire fighting training exercises between 1960 and 1975.

Table 8-4

Hazardous Wastes Disposed in

the North Station Landfill (1951-54)

Asbestos	800 lbs
Waste Paint and Thinner	1,000 gal
Pesticide Residues	64 lbs
Motor Oil	30 gal
Dichlorodifluoromethane	10 gal
PD 680	5 gal
Photo Lab Wastes (as Silver)	2 lbs

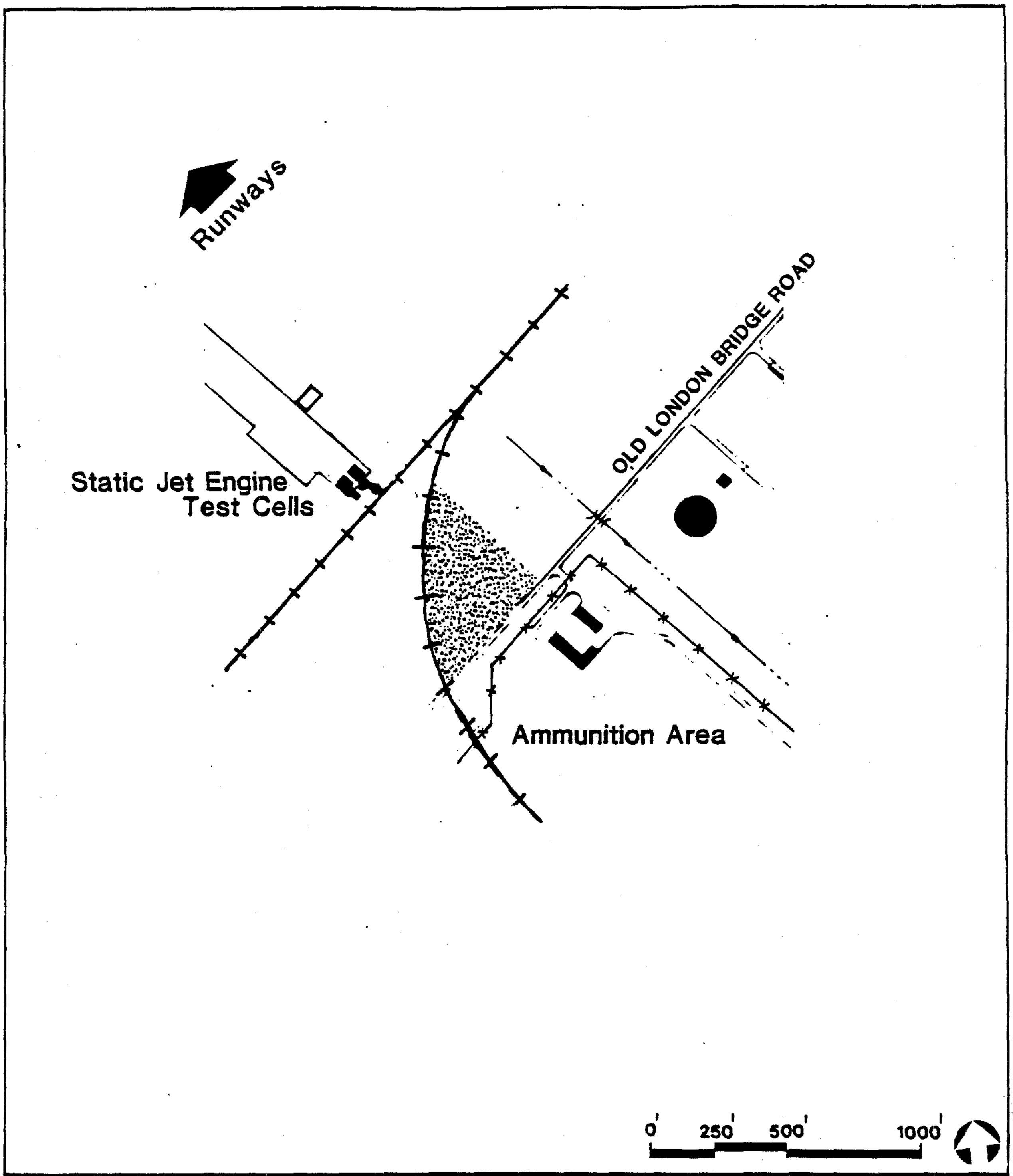

Figure 8-9
Site 9, Construction Staging Area

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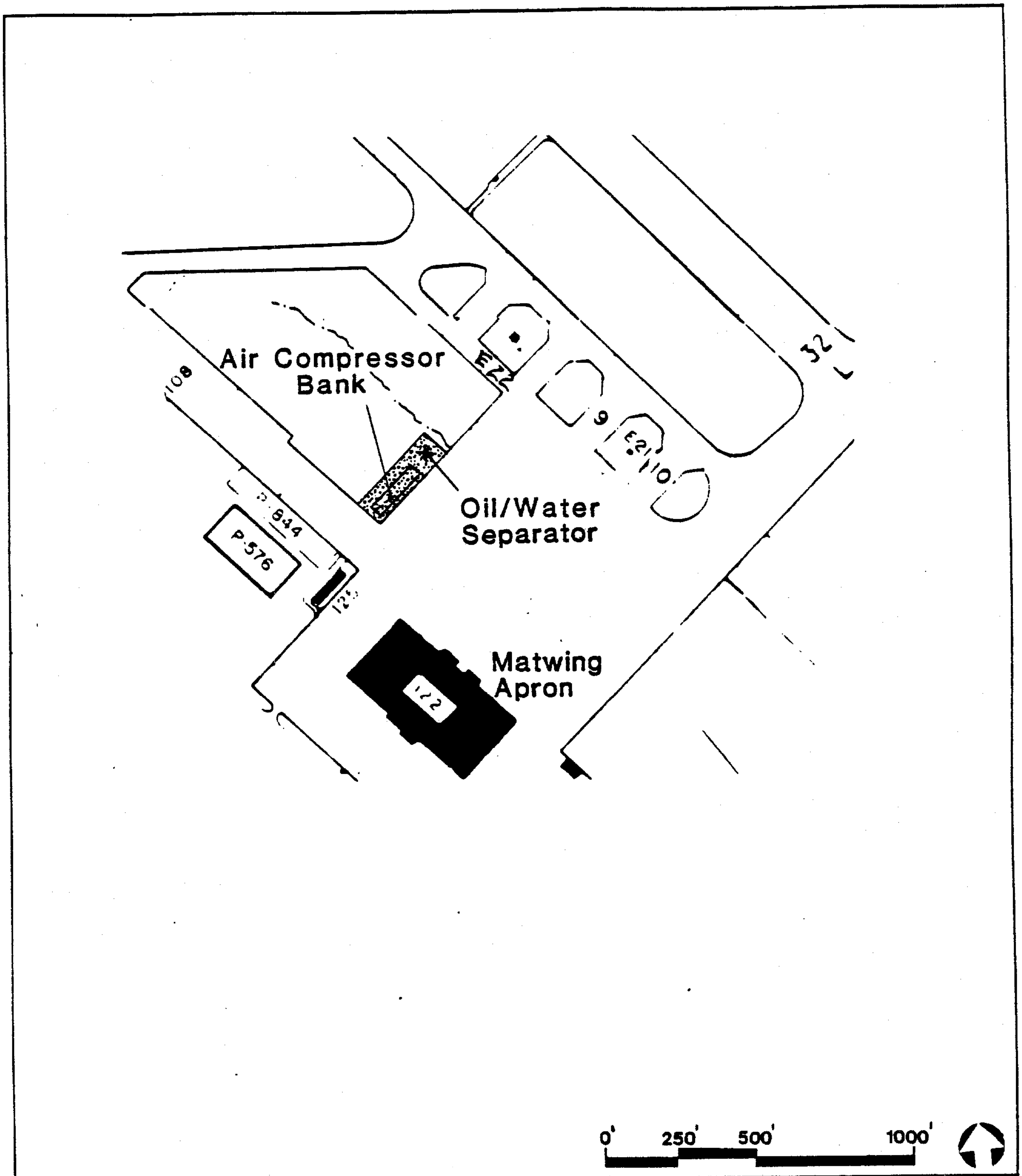

Figure 8-10
Site 10, Air Compressor Yard

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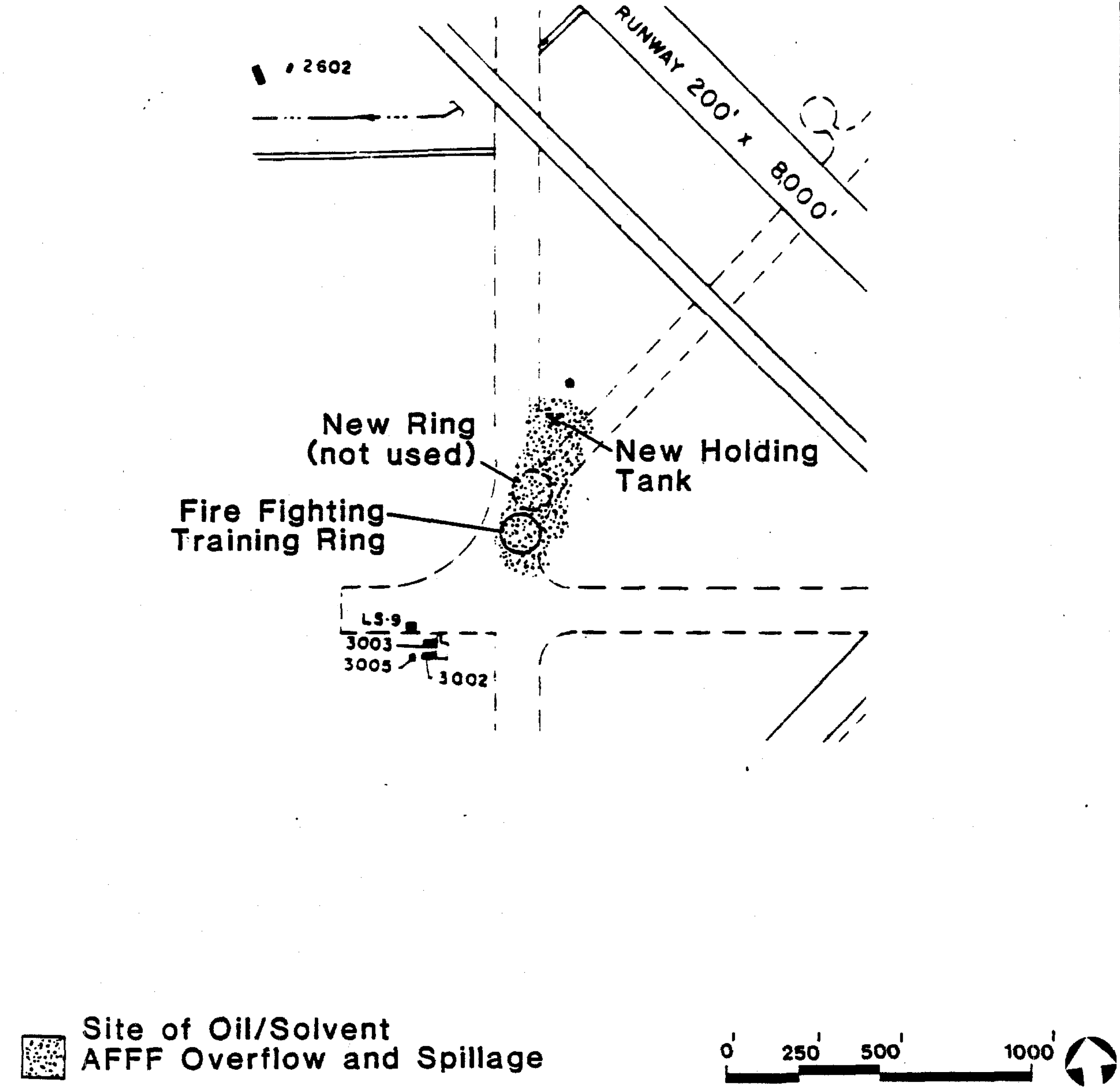

Figure 8-11

Site 11, Fire Fighter Training Area

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Since the fire pit was built, the amount of waste fuel used is estimated to be between 25,000 and 40,000 gallons per year. Based on the precautions taken, the flatness of the runway, and the burning of most of the waste fuel in the exercise, it is unlikely that damaging amounts of fuel escaped the runway to enter the soil and threaten the groundwater. Although there is some vegetation damage just north of the fire pit that would indicate escape of unburned fuel, a field investigation (R. E. Wright Associates, 1983) revealed that there is not a significant amount of fuel occurring in the subsurface soils immediately adjacent to the fire pit.

8.12 SITE 12 - DAY TANK. A 220,000-gallon tank (F20) is located just east of Runway 23. This tank was constructed in 1952. The day tank is connected by pipeline to the Tank Farm and currently stores JP-5. The tank is used to fill the ten rapid refueling pits located adjacent to Runways 32 and 23 (Figure 8-12).

There is a history of fuel leakage and spills associated with the day tank. During the 1960s there was a reported 80,000-gallon overfill at this tank. Since that time, substantial overfills of the tank have been reported in 1979 and 1981 (R. E. Wright Associates, 1983). More recently, slow leaks were detected in the subsurface fuel evacuation lines from the refueling pits. Although the return evacuation lines are no longer used, this leakage may have occurred between 1952 and 1983.

According to recent field investigations (R. E. Wright Associates, 1983), the loss of fuel from the day tank has resulted in the seepage of significant amounts of fuel into the ground. No evidence indicates that fuel from this source has accumulated in large enough quantities to enable it to be mobile in pure form. Rather, it has probably dispersed to such an extent that it is largely retained in the soil by capillary action.

The leakage of fuel from the buried evacuation pipeline, however, has resulted in the accumulation of pure fuel, perhaps a few thousand gallons, that is floating on the water table. There appears to be little potential for the migration of pure fuel away from the site. The greatest environmental risk resulting from the continuing presence of subsurface fuel at the day tank is expected to be the ongoing contamination of groundwater by dissolved fuel.

8.13 SITE 13 - TANK FARM. The tank farm is located west of Runway 23 off of London Bridge Road (Figure 8-13). Eight storage tanks are located in the complex (F11-16, F19, and F19A). JP-5 is transported to the tank farm by a pipeline owned and operated by W. R. Grace Company. There have reportedly been numerous leaks associated with this pipeline. Five 567,000 gallon tanks (F12-16) currently hold P-5 and were constructed in 1951. Two 25,000 gallon tanks were also constructed in 1951. Although currently not in use, they recently were used to store No. 2 fuel oil. The 420,000-gallon tank (F11) was constructed in 1965 and is also used to store JP-5. Leakage of fuels from the five large tanks (F12-16) was documented through field investigations (R. E. Wright Associates, February 1983).

Fuel leakage at the Tank Farm is known to have occurred both at the surface and underground. The tanks are known to have leaked for more than a decade, although the volumes lost are unknown. Test boring/monitoring wells installed at the Tank Farm indicate thousands of gallons of fuel are floating on the water table in the vicinity of the tanks. To prevent future leakage of fuel, underground transfer lines have been moved above ground, and the base of these tanks is currently being resurfaced with concrete

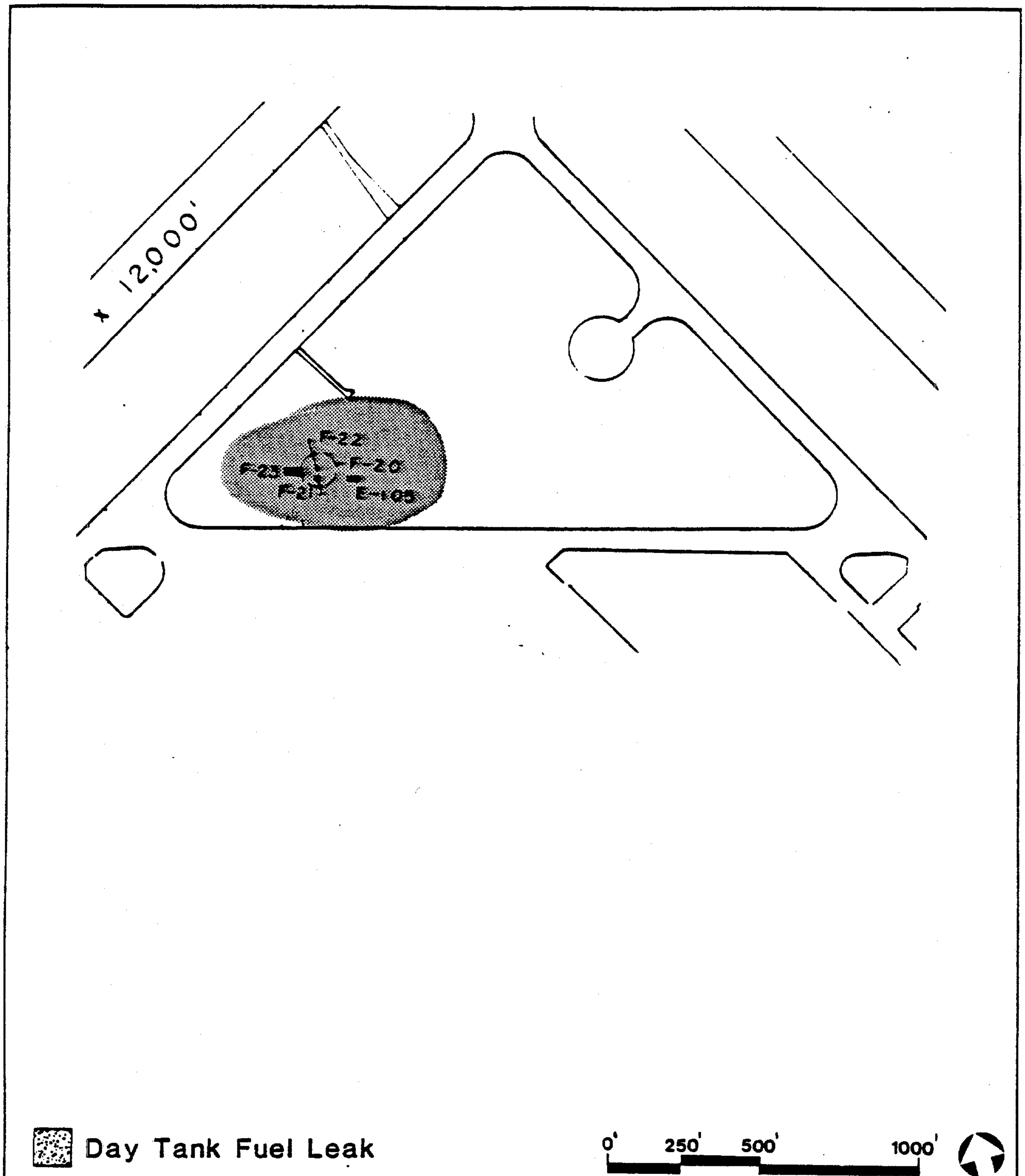

Figure 8-12
Site 12, Day Tank

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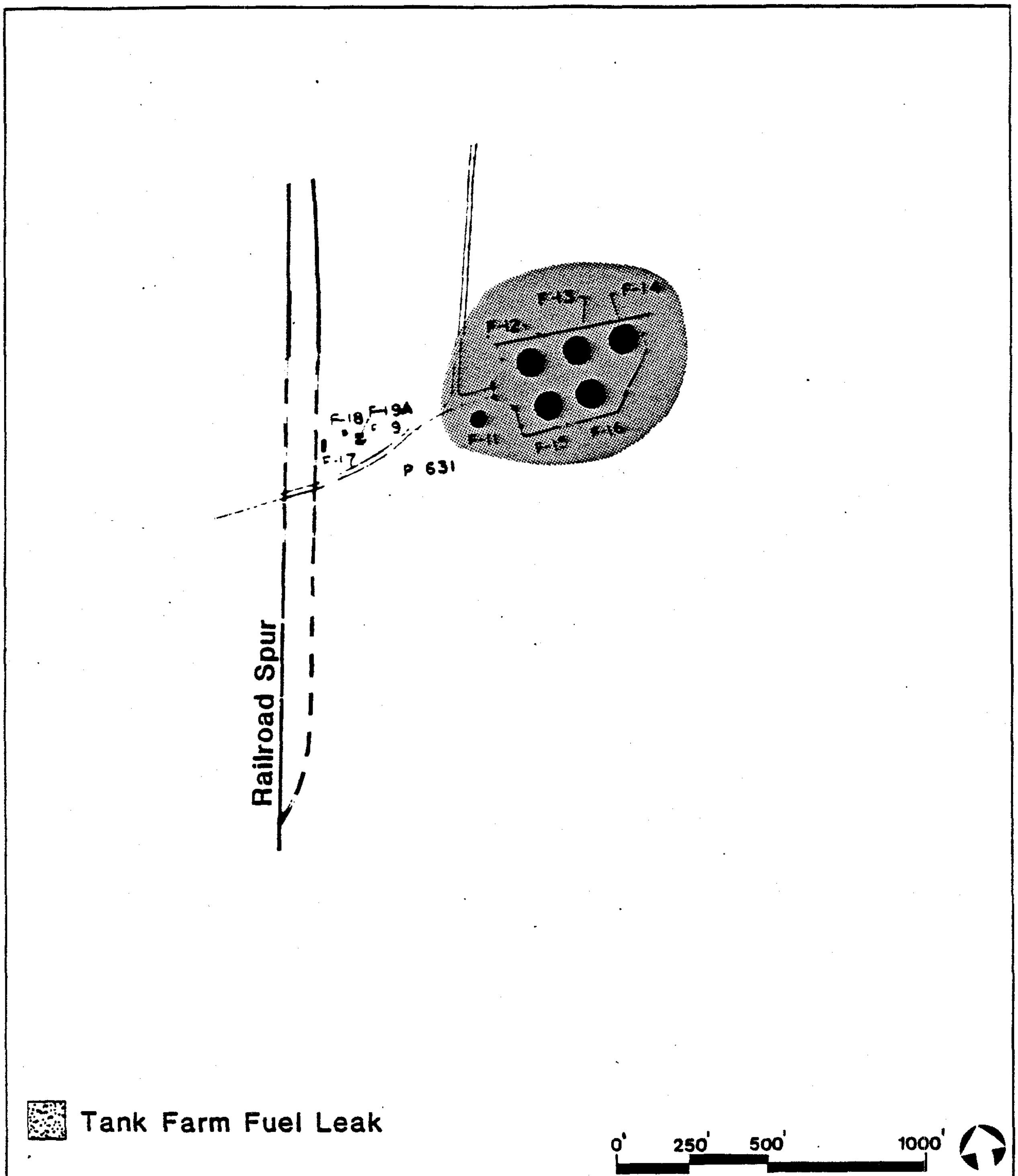

Figure 8-13
Site 13, Tank Farm

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and fiberglass. Conclusions of recently completed field investigations are provided below.

> The lens of fuel floating on the water table is somewhat mobile, gradually spreading outward from the Tank Farm area. Assuming that the leakage has been shut off, the lens will thin out, dispersing laterally. Lateral flow of floating fuel will continue until capillary forces equal those defined by the potential gradient. This equilibrium would be expected to occur within a few hundred feet of the perimeter fence under the observed conditions.
>
> It is possible that some of the pure fuel will discharge to the surface at some point downgradient from the Tank Farm before it achieves this equilibrium condition. Such discharge may be into the drainage ditch just south of the site, or into the swampy area immediately to the east. As of early 1984 there had not been any documented discharge of fuel.
>
> If it is not removed, the fuel in the ground at the Tank Farm will remain there for many years, gradually disipating as a result of natural volatilization, biodegradation, and dissolution. For the volume that apparently exists at the site, complete natural decomposition would probably take tens of years. During that period, the pure fuel will continue to be a source of dissolved fuel which will contaminate groundwater in the area. (R. E. Wright Associates, 1983)

8.14 SITE 14. FENTRESS LANDFILL. At the Auxiliary Landing Field at Fentress, there was a three-acre landfill that was used from 1945 to 1970 (Figure 8-14). It is located 1,500 feet north-northwest of the end of Runway 23. This landfill is thought to contain solvents, pesticides, construction debris, electrical conductors, and sanitary wastes. These wastes were burned and then buried. The size and burn/bury disposal method are similar to that used at Oceana's Fifth Green Landfill and the waste generating activities are similar. Estimates of hazardous wastes in the Fentress Landfill (Table 8-5) are based on estimates snown in Table 8-3. It is estimated that less than 1,000 gallons of PCBs in discarded transformers were placed in the Fentress Landfill.

8.15 SITE 15 - ABANDONED TANK FARM. The Abandoned Tank Farm is located approximately 300 yards east of the old CPO Club on the old North Station (Figure 8-15).

There are two concrete 50,000-gallon tanks (G5 and G6) that were formerly used to store aviation gas during the operation of North Station. A number of smaller aboveground tanks formerly stored kerosene and lube oils. At least two buried lines exist at the Abandoned Tank Farm by which wash fluids from tanks and pipes were drained to waste. The 50,000-gallon tanks were emptied of fuel and filled with water with the decommissioning of North Station. Tank G-5 was later used to store waste oil and fuel which may have included PD 680, naptha, and chlorinated and aromatic hydrocarbons, such as dichlorodifluoromethane, toluene, benzene, and their derivatives. It is no longer used for this purpose, but the tank is thought to still contain a foot of oily wastes, or about 5,000 gallons. Table 8-6 lists the estimated quantities of wastes in this tank.

Recent field investigations have shown that small amounts of fuel have leaked from either the tanks or buried pipeline and persist in the subsurface at the Abandoned Tank Farm (R. E. Wright Associates, 1983). There is no evidence, however, of any free

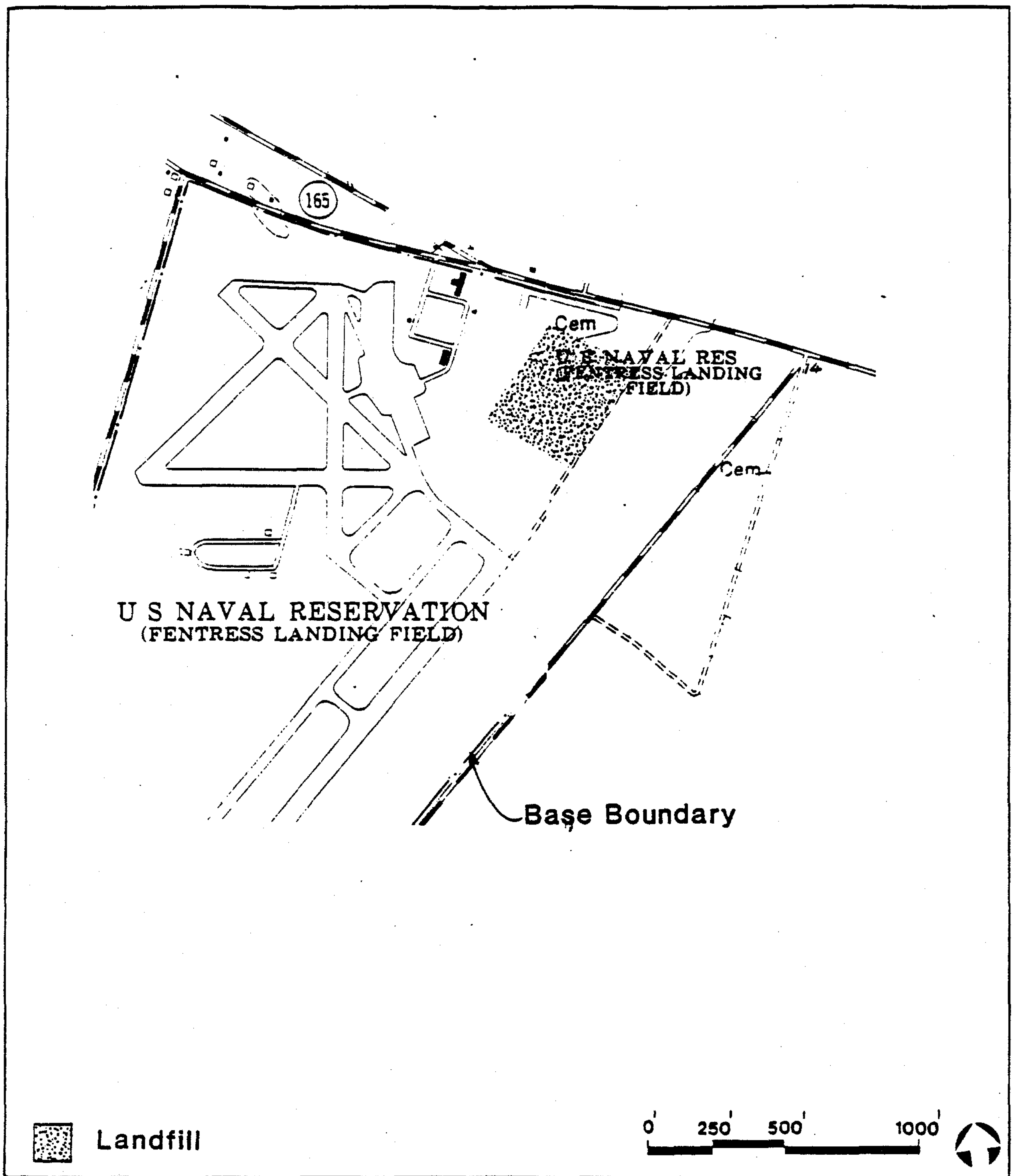

Figure 8-14
Site 14, Fentress Landfill

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Table 8-5

Hazardous Wastes Disposed in

the Fentress Landfill:

Residuals from Burning (1945-70)

Asbestos	1,050 lbs
Waste Paint and Thinner	175 gal
Pesticide Residues	10 gal
Lube Oils	40 gal
Dichlorodifluoromethane	55 gal

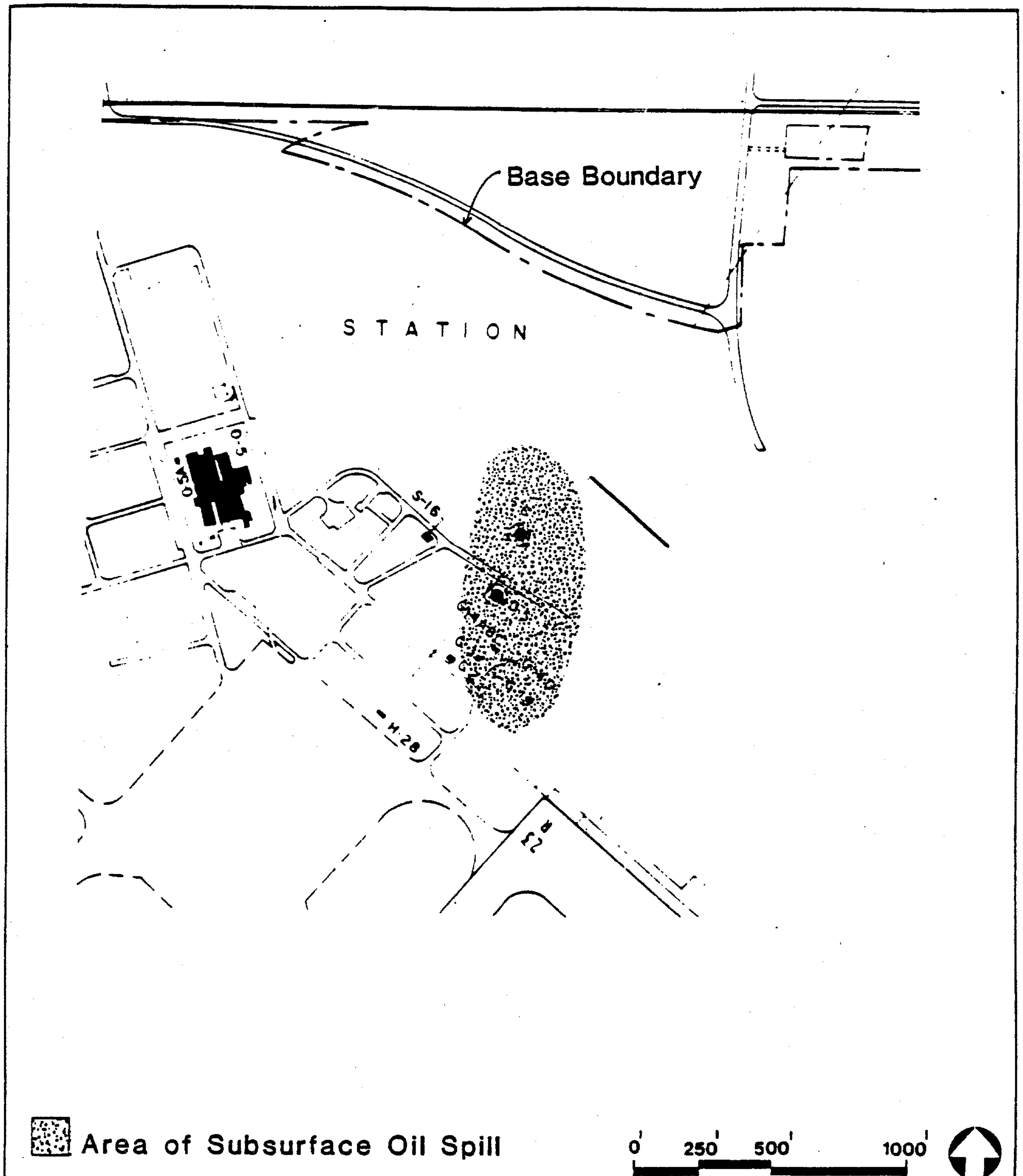

Figure 8-15
Site 15, Abandoned Tank Farm

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Table 8-6

Hazardous Wastes Disposed in

Tank A-5

Hazardous Waste	Approximate Volume in Gallons
Waste Fuels, (JP-5, JP-3, AVGAS), Oils, and Hydraulic Fluid	3,200
Paints, Paint Thinners, Strippers, and Sludges	320
PD 680	1,000
Naptha	50
B&D 3400 Engine Cleaner	120
Agitine	10
Trichlorotrifluoroethane	less than 1
TOTAL	5,000

product mobility. The relatively small amount of fuel which occurs in the subsurface appears to be bound in the soil by capillary action. Fuel was observed both above and below the water table and was probably dispersed in that manner by water table fluctuations. Groundwater at the site generally flows north to northeast and discharges into nearby shallow drainage ditches that flow north toward Potters Road. It is likely that ground water downgradient (north) from the site contains low levels of dissolved fuel. However, in view of the small volume of subsurface fuel that was observed at the site, the dissolved fraction in the groundwater is expected to be so low that it is probably insignificant.

8.16 SITE 16 - PESTICIDE SHOP. Between 1968 and 1982, when the Public Works hazardous waste pickup program began, pesticide mixing tank rinse water was discharged to the ground around pesticide storage building (821) at the rear of the Public Works compound on London Bridge Road. Figure 8-16 shows the location of the ground contaminated by pestides. The pesticides used and thus suspected to be in the soils around the shop are 2,4-D, 2,4,5-T, baygon heptachlor, malathion, dustban, nibaryl, aldrin, chlordane, bromacil, warfarin, and DDT. Typically 2,000 pounds of active ingredients of these pesticides were mixed for application each year. It is estimated that 1 percent or less of the pesticides remained in the mixing tanks and were rinsed out to the ground. Thus, during the 15-year period when this practice occurred, less than 30 pounds (collectively) of the pesticides listed were discarded to the ground around Building 821 in tank rinse water.

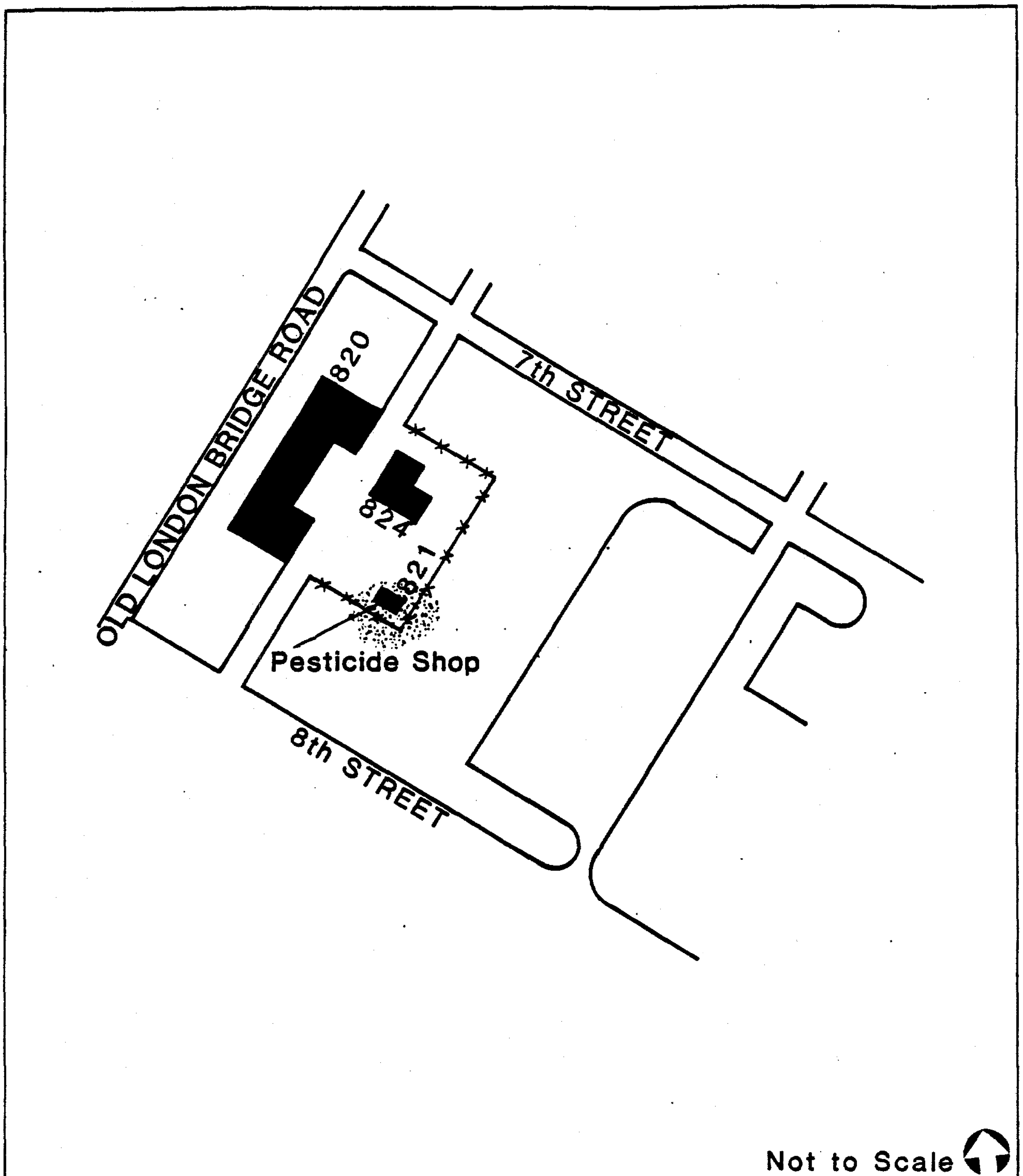

Figure 8-16
Site 16, PWD Pesticide Shop

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Cartographic Branch, National Archives, Alexandria, Virginia. Aerial photographs.

Records Branch, Washington National Records Center, GSA, 4205 Suitland Road, Suitland, Maryland 20409. No files.

Archives Branch, Washington National Records Center, GSA, 4205 Suitland Road, Suitland, Maryland 20409. No information.

Naval Facilities Engineering Command Historian, NCBC Port Hueneme, California 93043. Historical files, memoranda, histories, data sheets.

Real Estate Branch, Naval Facilities Engineering Command Headquarters, Alexandria, Virginia. Historical maps.

Environmental Quality Branch, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia, 23511. Environmental files, including hazardous waste, PCB, POL, and pesticide information.

Installations Planning Branch, Naval Facilities Engineering Command, Atlantic Division, Norfolk Virginia, 23511. Master plans, environmental assessments and impact statements, and general development maps.

Real Estate Branch, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia, 23511. Cadastral files and summary maps, soil boring information, forestry and wildlife reports.

Project Management Branch, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia, 23511. Project-specific information.

Naval Sea Systems Command, Crystal City, Alexandria, Virginia 22331. No information.

Naval Air Systems Command, Crystal City, Alexandria, Virginia 22331. No information.

DOD Explosives Safety Board, Hoffman Building I, Room 856-C, 2461 Eisenhower Avenue, Alexandria, Virginia 22331. Ordnance surveys.

U.S. Geological Survey, Reston, Virginia. Maps and geological information.

Virginia Geological Survey, Charlottesville, Virginia. Geologic and physiographic information.

Virginia State Water Control Board, Tidewater office, Virginia Beach, Virginia. Hydrological information.

APPENDIX B

129 PRIORITY POLLUTANTS

Acenaphthene
Acrolein
Acrylonitrile
Aldrin/Dieldrin
Antimony and compounds*
Arsenic and compounds
Asbestos
Benzene
Benzidine
Beryllium and compounds
Cadmium and compounds
Carbon tetrachloride
Chlordane (technical mixture and metabolites)
Chlorinated benzenes (other than dichlorobenzenes)
Chlorinated ethanes (including 1,2-dichloroethane, 1,1,1-trichloroethane, and hexachloroethane)
Chloroalkyl ethers (chloromethyl, chloroethyl, and mixed ethers)
Chlorinated naphthalene
Chlorinated phenols (other than those listed elsewhere; includes trichlorophenols and chlorinated cresols)
Chloroform
2-chlorophenol
Chromium and compounds
Copper and compounds
Cyanides
DDT and metabolites
Dichlorobenzenes (1,2-, 1,3-, and 1,4-dichlorobenzenes)
Dichlorobenzidine
Dichloroethylenes (1,1- and 1,2-dichloroethylene)
2,4-dichlorophenol
Dichloropropane and dichloropropene
2,4-dimethylphenol
Dinitrotoluene
Diphenylhydrazine
Endosulfan and metabolites
Endrin and metabolites
Ethylbenzene
Fluoranthene
Haloethers (other than those listed elsewhere: includes chlorophenylphenyl ethers, bromophenylphenyl ether, bis(dischloroisopropyl) ether, bis-(chloroethoxy) methane and polychlorinated diphenyl ethers)
Halomethanes (other than those listed elsewhere: includes methylene chlorid methylchloride, methylbromide, bromoform, dichlorobromomethane, trichlorofluoromethane, dichlorodifluoromethane)
Heptachlor and metabolites
Hexachlorobutadiene
Hexachlorocyclohexane (all isomers)
Hexachlorocyclopentadiene
Isophorone
Lead and compounds
Mercury and compounds
Naphthalene
Nickel and compounds
Nitrobenzene
Nitrophenols (Including 2,4-dinitrophenol) dinitrocresol)
Nitrosamines
Pentachlorophenol
Phenol
Phthalate esters
Polychlorinated biphenyls (PCSs)
Polynuclear aromatic hydrocarbons (including benzanthracenes, benzopyrenes, benzofluoranthene, chrysenes, dibenzanthracenes, and indenopyrenes)
Selenium and compounds
Silver and compounds
2,3,7,8- Tetrachlorodibenzo-p-dioxin (TCDD)
Tetrachloroethylene
Thallium and compounds
Toluene
Toxaphene
Trichloroethylene
Vinyl chloride
Zinc and compounds

* The term "compounds" shall include organic and inorganic compounds.